EXHIBIT 1

HAMILTON BIOLOGICAL

May 23, 2019

Dan Silver, Executive Director
Endangered Habitats League
8424 Santa Monica Blvd., Suite A 592
Los Angeles, CA 90069-4267

SUBJECT: REVIEW OF RECIRCULATED DRAFT EIR, OTAY RANCH RESORT VILLAGE 13, ALTERNATIVE H COUNTY OF SAN DIEGO

Dear Mr. Silver,

On behalf of the Endangered Habitats League, Hamilton Biological, Inc., evaluated the CEQA analysis related to proposed impacts to the Quino Checkerspot Butterfly (QCB; *Euphydryas editha quino*), Western Spadefoot (*Spea hammondii*), and Golden Eagle (*Aquila chrysaetos*) contained in the Recirculated Draft EIR (RDEIR) for the proposed Otay Ranch Resort Village 13 project (project) in the County of San Diego (County). Documents reviewed include:

- DEIR Section 2.3, Biological Resources (March 2015).
- Letter dated May 21, 2015, commenting on the 2015 DEIR by the US Fish and Wildlife Service (USWFS) and California Department of Fish and Wildlife (CDFW).
- Letter dated May 22, 2015, commenting on the 2015 DEIR by the California Chaparral Institute and Center for Biological Diversity.
- Seven letters commenting on the 2015 DEIR by QCB experts David Faulkner, Travis Longcore, Daniel Marschalek, Ken Osborne, Michael Klein, Greg Balmer, Gordon Pratt, and Stuart Weiss.
- Appendix D-3: Biological Resources Technical Report Supplemental Analysis, Otay Ranch Resort Village 13 – Alternative H (April 2019).
- Appendix D-24: Otay Ranch Resort Village 13 Alternative H, 1993 Otay Ranch GDP/SRP Program EIR, Mitigation Monitoring Program Compliance (January 2019).
- Otay Ranch Final Program Environmental Impact Report (1992/1993).
- Otay Ranch Subregional Plan, "County Board of Supervisors Final Plan," Final CEQA Findings of Fact and Statement of Overriding Considerations, as revised to reflect final ac-

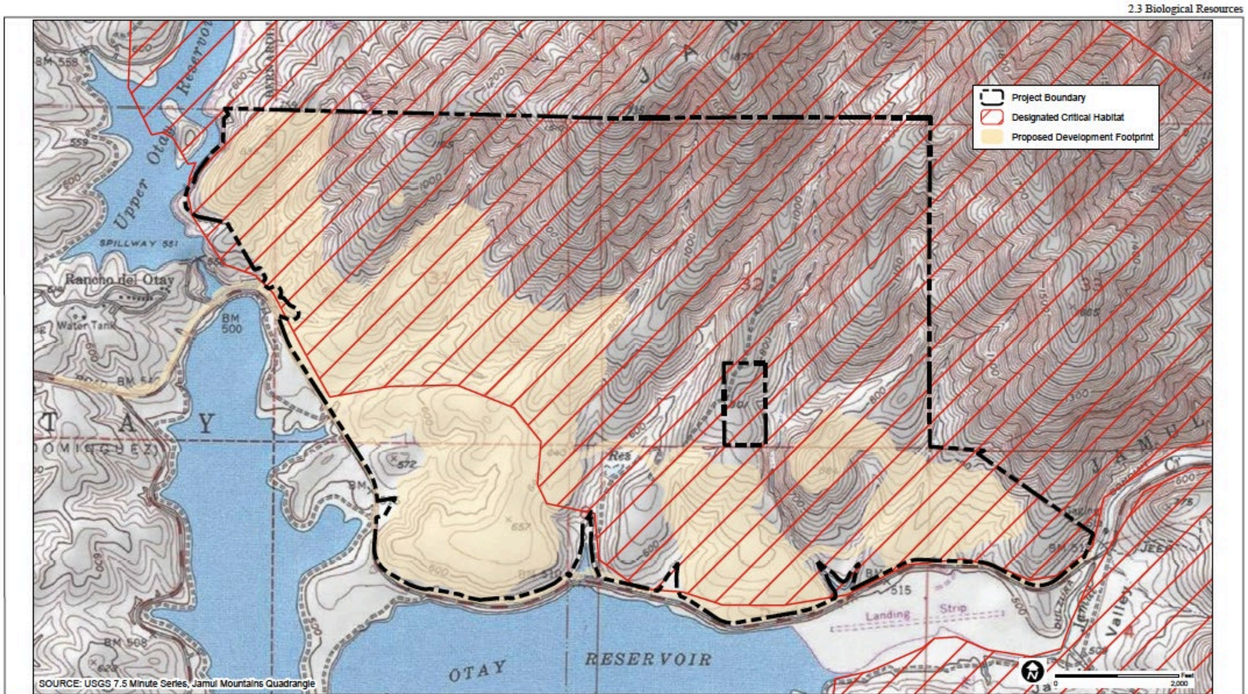
tions taken on October 28, 1993 (Final CEQA Findings).

- DEIR for the Otay Village Ranch 14 and Planning Areas 16/19 project.
- *Final Otay Ranch Village 14 and Planning Areas 16/19, 1993 Otay Ranch GDP/SRP PEIR Mitigation Monitoring Program Compliance*.

CEQA Analysis, Quino Checkerspot Butterfly

The Village 13 site contains 1,624 acres of critical habitat for the QCB; Figure 2.3-12 in the 2015 DEIR depicts its distribution on the Village 13 project site:

2.3 Biological Resources



Source: DUDEK, 2014

Figure 2.3-12
Quino Checkerspot Butterfly Designated Critical Habitat

Missing from both the 2015 DEIR and Appendix D-3 is any discussion of the relevance of critical habitat to conservation planning on the project site. As stated in recent guidance from the USFWS[1]:

> **The purpose of critical habitat is to identify the areas that are essential to the species' recovery.** Once critical habitat is designated, it can contribute to the conservation of listed species in several ways. Specifying the geographic location of critical habitat facilitates implementation of section 7(a)(1) of the Act by identifying areas where Federal agencies can focus their conservation programs and use their authorities to further the purposes of the Act. Designating critical habitat also helps focus the conservation efforts of other conservation partners, such as State and local governments, nongovernmental organizations, and individuals. [emphasis added]

The EIR should describe and acknowledge the conservation purpose of designating crit-

[1] USFWS. 2016. Federal Register 81(28):7414-7415.

ical habitat for endangered species on the Village 13 project site.
The USFWS is updating the QCB Recovery Plan. The current draft plan, dated March 2019, provides relevant information about the ecological importance of the QCB population at Village 13 (part of the Otay Core Occurrence Complex):

> Finally, we have noticed that most of the largest and apparently most resilient Quino populations are associated with relatively large, long-established reservoirs mostly surrounded by hills. Specifically: Lake Skinner (established in 1973; Skinner/Johnson Core Occurrence Complex); Vail Lake (established in 1948; Oak Mountain Core occurrence complex); and **Lower Otay Lake (established in 1934; Otay Core Occurrence Complex)**. This is not likely a coincidence, as such water bodies ameliorate the effects of drought on Quino habitat in the immediate vicinity due to the "lake effect," a well-documented climate phenomenon where bodies of fresh water, especially those with hilly surroundings, increase humidity and decrease temperatures of surrounding land areas (e.g. Condie and Webster 1997, entire[2]; Mohamed Degu et al. 2011, entire[3], Ekhtiari et al. 2017, entire[4]; Theeuwes et al. 2013, entire[5]). As described in the recovery plan (Service 2003, pp. 25, 50, 55, 86, 87, 89), through its large thermal mass, the ocean buffers coastal habitat from high temperature and low humidity extremes. On a smaller scale lakes have a similar effect, retaining heat and cold, and re-releasing them when temperature changes occur. **Therefore we believe it is essential to focus conservation and management efforts first on those habitat patches within core occurrence complexes proximal to large water bodies, which likely contribute to population resilience.** [emphasis added]

The Village 13 EIR fails to inform readers of importance of the project site to the continued existence of the QCB. As a result, the CEQA analysis fails to adequately support its conclusion that impacting **474.8 acres of QCB critical habitat and 389 acres of QCB occupied habitat** adjacent to Lower Otay Lake would not represent significant adverse effects on the species. As discussed subsequently, this conclusion conflicts with the conclusion of the Otay Ranch Final Program Environmental Impact Report, which the County certified in 1993.

QCB Occupied Habitat vs. "Potential Occupied Habitat"

For reasons explained herein, delineating "occupied habitat" represents a critically important aspect of the CEQA analysis for the proposed project. Table 8 in Appendix D-3 — "Alternative H Permanent Impacts to Special-Status Wildlife Species or their Habitat

[2] Condie, S. A. and I. T. Webster. 1997. The influence of wind stress, temperature, and humidity gradients on evaporation from reservoirs. Water Resources Research 33:2813–2822.

[3] Mohamed Degu, A., F. Hossain, D. Niyogi, R. Pielke Sr., J. Marshall Shepherd, N. Voisin, and T. Chronis. 2011. The influence of large dams on surrounding climate and precipitation patterns. Geophysical Research Letters 38:1–7.

[4] Ekhtiari, N., S. Grossman-Clark, H. Koch, W. Meira de Souza, R. V. Donner, and J. Volkholz Effects of the Lake Sobradinho Reservoir (Northeastern Brazil) on the Regional Climate. Climate 5:1–17.

[5] Theeuwes, N. E., A. Solcerová, and G. J. Steeneveld. 2013. Modeling the influence of open water surfaces on the summertime temperature and thermal comfort in the city. Journal of Geophysical Research: Atmospheres 118:8881–8896.

that are Present On Site or with Moderate to High Potential to Occur" — states that **474.83 acres of critical habitat and 389 acres of "potential occupied habitat"** would be impacted by implementation of Alternative H. The EIR does not define "potential occupied habitat" or how it differs from "occupied habitat."

The most recent USFWS 5-year status report on the QCB, issued in 2009[6], describes the methodology for determining the distribution of "occupied habitat" on a given site:

> The scientific data available to us for use in delineating Quino population distributions consists of geographic information system (GIS)-based habitat information, subspecies observation locations, and subspecies movement data from mark-release-recapture studies. Population-scale occupancy (a population distribution) is defined by all areas used by adults during the persistence time of a population (years to decades; USFWS 2003a, p. 24). Distribution studies over multiple years are required to quantify Quino population distributions based on recorded subspecies locations. Therefore, we discuss Quino population locations in terms of "occurrence complexes" (USFWS 2003a, p. 35), which are our best estimators of approximate population location and population membership. **Occurrence complexes are mapped in the Recovery Plan using a 0.6 mile (1 kilometer) movement radius from each butterfly observation, and may be based on the observation of a single individual (Figures 1 and 2).** Occurrences within approximately 1.2 miles (2 kilometers) of each other are considered to be part of the same occurrence complex, as these occurrences are proximal enough that the observed butterflies were likely to have come from the same population (USFWS 2003a, p. 35). Occurrence complexes may expand due to new butterfly observations, or contract due to habitat loss (e.g., occurrence complexes are defined in part by extant habitat, USFWS 2003a, p. 78). This process resulted in the identification of a habitat-based population distribution for each core occurrence complex that is occupied at a population distribution scale, but where detectability may vary annually. [emphasis added]

The above-described methodology represents the only accepted procedure for delineating QCB "occupied habitat". Following are three examples of the USFWS and California agencies employing the above-described methodology to delineate "occupied habitat" for the QCB:

- Page 82 of a Biological Opinion dated November 10, 2010, for the Sunrise Powerlink Project, states "Using a 1-km (0.6-mi) buffer around known Quino locations, we estimate that there are 497 ha (1,128 ac) of occupied Quino habitat within the action area."
- Page 4 of a Biological Opinion dated September 1, 2011, for the proposed East County Substation and Transmission Line Project, states, ". . . occupied Quino habitat, defined as any suitable Quino habitat within 0.6 mile (1 kilometer) of a Quino sighting . . .".
- Page 3 of a Biological Opinion dated September 2, 2011, for the Tule Wind Project (in an area not designated critical habitat for QCB) states, "Occupied Quino habitat is defined as any suitable Quino habitat within 0.6 mile (1 kilometer) of a Quino sighting." HDR Engineering, Inc., used this same standard in the 2010 DEIR for the Tule Wind Project.

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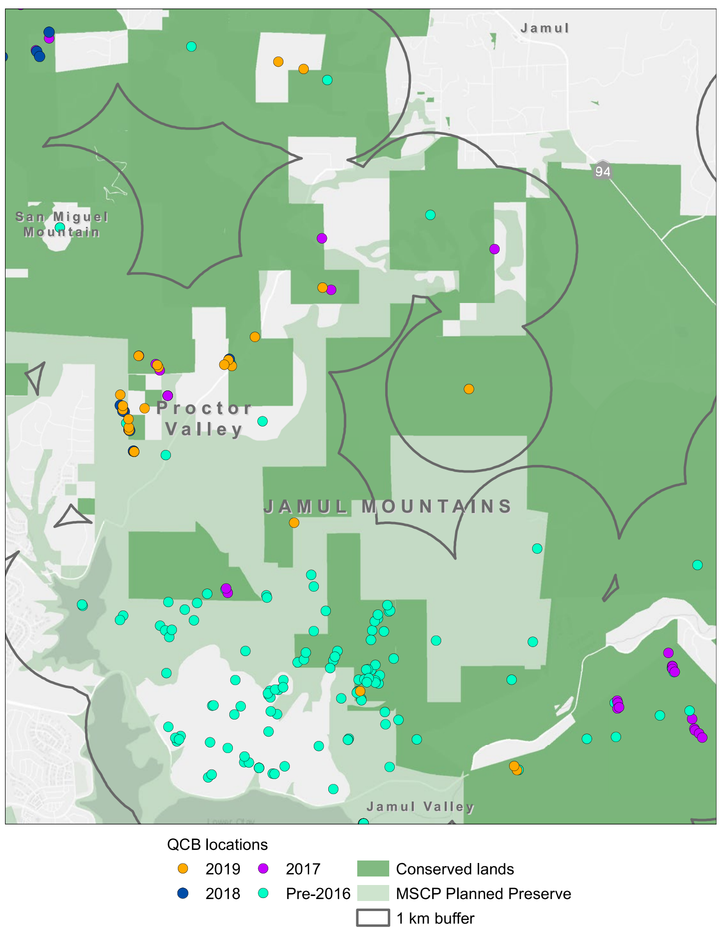
[6] https://www.fws.gov/carlsbad/SpeciesStatusList/5YR/200908135YRQCB.pdf

Finally, in an email to Mark Wardlaw at the County dated May 1, 2019, referring to the Village 14 and Planning Areas 16/19 project, Deputy Field Supervisor Scott Sobiech of the USFWS, Carlsbad Field Office, wrote:

> This is an FYI to you. We want to make sure the County has the most recent Quino checkerspot butterfly occurrence information. Here is an updated map with Quino survey results in Proctor Valley. It includes all of the occupancy data that we have received from permitted biologists thus far in 2019 (see attached table). Biologists who conduct surveys for the Quino are required to send us the results of their surveys as a condition of their recovery permit. This data is entered into a GIS data base (species occurrence data) which is available to the public via our website (https://www.fws.gov/carlsbad/GIS/CFWOGIS.html). **When determining occupancy in any given area, the Service adds a 1 km buffer around each occurrence (this map is also attached).** [emphasis added]

The USFWS map, showing recent QCB sightings plus 1-km buffers, is provided below:



On May 1, 2019, Deputy Field Supervisor Scott Sobiech sent this map to Mark Wardlaw at the County dated May 1, 2019, showing QCB detections on the Village 13 site and elsewhere in Proctor Valley, plus the 1-km buffer around each sighting that defines "occupied habitat." [Note that the legend erroneously refers to "Pre-2016" QCB locations; the green dots actually refer to "Pre-2017" QCB locations.]

As the preceding map shows, all suitable QCB habitat on the Village 13 site satisfies the applicable criteria for "occupied habitat." For this reason, the Village 13 EIR must acknowledge that the USFWS defines all habitat suitable for QCB on the Village 13 site as "occupied" — not as "potential occupied habitat."

COMPLIANCE WITH THE 1992/1993 PROGRAM EIR

In 1993, the County certified the Otay Ranch Final Program Environmental Impact Report, issuing the *Otay Ranch Subregional Plan, "County Board of Supervisors Final Plan," Final CEQA Findings of Fact and Statement of Overriding Considerations, as revised to reflect final actions taken on October 28, 1993* (Final CEQA Findings). Part of this Program EIR analyzed future development of the Village 13 project site.

CEQA Section 15168(c) states:

> **Use With Later Activities.** Subsequent activities in the program must be examined in the light of the program EIR to determine whether an additional environmental document must be prepared.
>
> (1) If a later activity would have effects that were not examined in the program EIR, a new initial study would need to be prepared leading to either an EIR or a negative declaration.
>
> (2) If the agency finds that pursuant to Section 15162, no new effects could occur or no new mitigation measures would be required, the agency can approve the activity as being within the scope of the project covered by the program EIR, and no new environmental document would be required.
>
> (3) An agency shall incorporate feasible mitigation measures and alternatives developed in the program EIR into subsequent actions in the program.
>
> (4) Where the subsequent activities involve site specific operations, the agency should use a written checklist or similar device to document the evaluation of the site and the activity to determine whether the environmental effects of the operation were covered in the program EIR.
>
> (5) A program EIR will be most helpful in dealing with subsequent activities if it deals with the effects of the program as specifically and comprehensively as possible. With a good and detailed analysis of the program, many subsequent activities could be found to be within the scope of the project described in the program EIR, and no further environmental documents would be required.

Appendix D-24 to the RDEIR, entitled *Otay Ranch Resort Village 13 Alternative H, 1993 Otay Ranch GDP/SRP Program EIR, Mitigation Monitoring Program Compliance*, evaluates (a) the applicability of various requirements of the 1993 Final CEQA Findings to the currently proposed Village 13 project, and (b) the extent to which the EIR for the Village 13 project satisfies those requirements.

Page 39 of Appendix D-24 states that the 1993 Final CEQA Findings are applicable to the current CEQA analysis of the proposed Village 13 project, and finds that the Final CEQA Findings are "Satisfied through project-level mitigation for Alternative H." The analysis is given as follows on pages 39-40 of Appendix D-24:

> Preservation for this species will follow resource agency recommendations per take permit in accordance with Section 7, Section 10, or the Quino Checkerspot Butterfly Addition. 77% of individuals are proposed to be preserved and 74% of the suitable habitat will be preserved. The ridgelines and hilltops in the northern and eastern portion of the site will be preserved. Areas of

> relatively sparse coastal sage scrub occupied by the larval host plant will be preserved. **A total of 475 acres of critical habitat within the Otay Unit will be impacted.** This Unit is composed of a total of 34,941 acres. Alternative H will conserve 1,112 acres of suitable restored or occupied Quino Checkerspot butterfly habitat. Alternative H is designed to mitigate impacts at a ratio of 2.86:1. Refer to Biological Resources Technical Report Supplemental Analysis for Alternative H (Draft Appendix D-3). [emphasis added]

With regard to QCB, page 62 of the 1993 Final CEQA Findings states:

> Quino Checkerspot (*Euphydryas editha quino*)
>
> - **One hundred percent (or approved HCP/MSCP standards) of occupied habitat required for this species shall be preserved.** [emphasis added]
>   - At the SPA level, the Applicant shall conduct focused surveys for this species in appropriate habitat.
>   - The Applicant shall assess direct and indirect impacts from proposed development and roads.
>   - A mitigation plan for significant impacts shall be prepared and implemented. The following measures shall be incorporated into the mitigation plan:
>   - The project is designed to avoid impacts to occupied habitat.
>   - Preserve in natural open space all occupied habitat.
>   - Preserve historical habitat in conjunction with mitigation for other species (e.g., *Streptocephalus woottoni*).
>   - Introduce into vernal pools where appropriate, native *Plantago* species, the larval hosts for Quino checkerspot.

At Village 13, where all suitable QCB habitat is known to be occupied, the standard of protection identified in the 1993 Final CEQA Findings is not ambiguous: "One hundred percent (or approved HCP/MSCP standards) of occupied habitat required for this species shall be preserved." The CEQA analysis in Appendix D-24 must be amended to reflect the fact that **proposed impacts to 474.8 acres of QCB critical habitat and 389 acres of QCB occupied habitat** at Village 13 would be entirely incompatible with the 1993 Final CEQA Findings.

Proposed "Quino Amendment"

The DEIR at page 2.3-19 refers to an unapproved amendment to the MSCP:

> The proposed MSCP Subarea Plan Quino Checkerspot Butterfly Amendment (Quino Amendment), which has been used as guidance for this analysis, would require 2:1 preservation of suitable habitat for impacts to the Quino checkerspot butterfly, for a total of 966 acres. The Project proposes to include 962 acres of suitable or occupied coastal sage scrub and 4 additional acres of Quino checkerspot butterfly habitat restoration equaling 966 acres of total habitat mitigation, meeting the proposed Quino Amendment mitigation ratio. This acreage is available on-site within the proposed Preserve. Because the proposed Quino Amendment has not been adopted, impacts to Quino checkerspot butterfly individuals and potentially occupied habitat are considered significant absent mitigation (Impact BI-11).

Until any proposed Quino Amendment to the MSCP Subarea Plan is approved and adopted, it cannot be pressed into service as the *de facto* threshold of significance for purposes of CEQA review. The applicable CEQA analysis, contained in the Final CEQA Findings adopted by the County Board of Supervisors in 1993, specifies 100 percent preservation of all QCB occupied habitat. This is the relevant, adopted standard that must be satisfied.

INADEQUATE TREATMENT OF WESTERN SPADEFOOT ISSUES

The Western Spadefoot is a California Species of Special Concern. For the EIR addressing the Village 14 and Planning Areas 16/19 project, focused surveys for the Western Spadefoot resulted in detection of 16 breeding pools in the vicinity of proposed impact area:

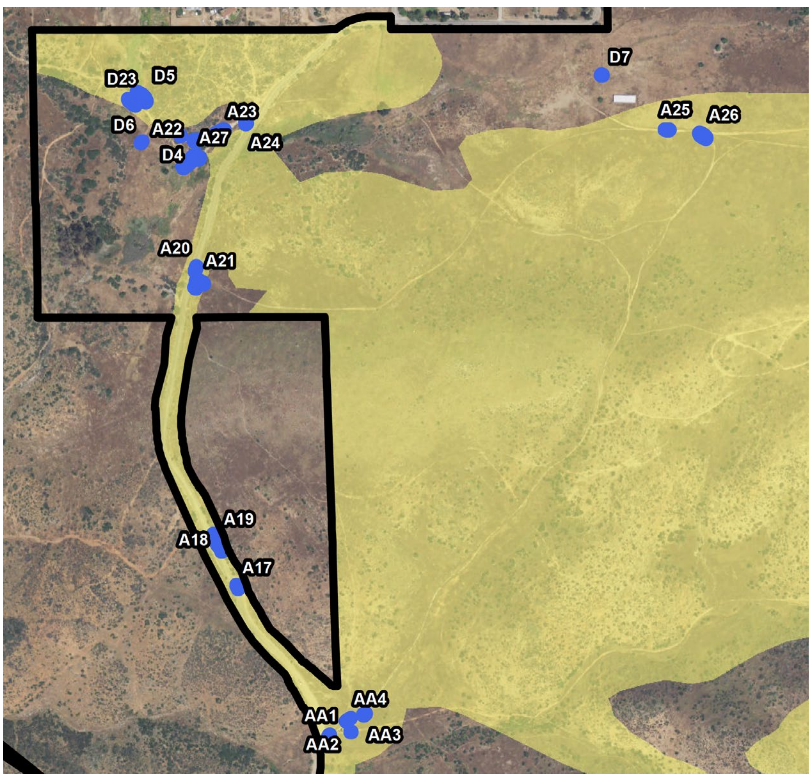


Figure 2.4-9 on page 2.4-445 of the Village 14 DEIR depicts the 16 pools relative to the proposed "Development Footprint," shown in yellow screen. Note that several pools, including AA1, AA2, A17, A18, A19, A20, A21, and A23, are located in pools formed along the shoulder of Proctor Valley Road.

Both the Village 13 DEIR and the Recirculated Appendix D-3 fail to mention the known status of the Western Spadefoot in Proctor Valley a short distance north of the Village 13 site. Both documents fail to report that focused spadefoot surveys — such as those conducted on at Village 14 — are needed to adequately evaluate a project's potential adverse effects to this species. Since the needed surveys were not conducted, the CEQA analysis is based on inadequate information.

Even in the absence of focused surveys, the DEIR at page 2.3-59 acknowledges, "Tadpoles incidentally observed in a single depression on K8 mesa. Could occur within pools that inundate." Table 2.3-10 on page 2.3-77 indicates that the 0.26-acre complex of vernal pools would be preserved. Figure 6 in Appendix A to Appendix D-3 shows that the Proposed Development Footprint for Alternative H would surround the spadefoot-occupied vernal pool complex at the K-8 mesa:

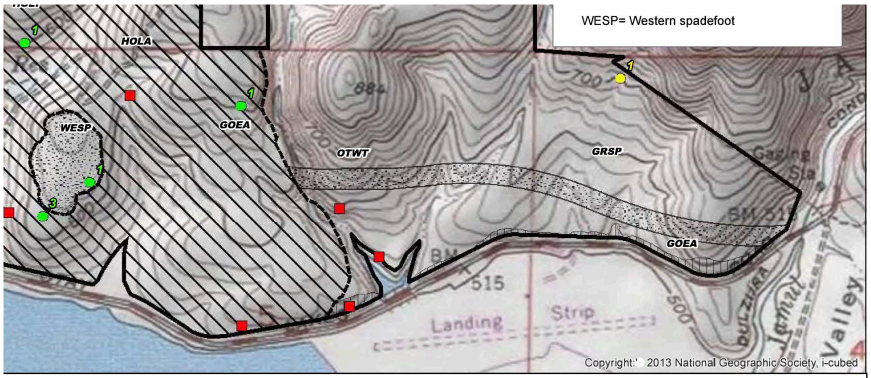


FIGURE 6
Sensitive Wildlife Species Map with Proposed Development Footprint
Otay Ranch Resort Village - Alternative H Biological Resources Review Project

The polygon at the left side of this excerpt, labeled "WESP", represents the vernal pool complex used by breeding Western Spadefoots. The surrounding cross-hatch pattern represents the "Proposed Development Footprint."

The DEIR provides no evidence or studies in support of its conclusion that preserving the vernal pool complex at the K8 mesa, in the configuration shown above, would maintain a viable population of Western Spadefoots on the Village 13 project site. Additional information on the species' natural history and habitat requirements is required to complete the necessary analysis.

Life History and Ecological Requirements

In a recent report, the United States Geological Survey (USGS) — serving as the Independent Science Advisor (ISA) to the City of Santee — provided independent scientific information regarding the life history and ecological requirements of the Western Spadefoot in southern San Diego County[7]. The following discussions summarize relevant information from the USGS report.

Dispersal from Breeding Pools to Aestivation Sites

Western Spadefoots spend large parts of the year aestivating underground, often well away from their breeding ponds. As stated on page 5 of the USGS report:

> Western spadefoot require periodic wetlands for breeding purposes and upland, terrestrial habitats for foraging and aestivating during the hot, dry summers, one of these habitat elements without the other would not be sustainable in the long term. Although there are no direct estimates of a minimum patch requirement for western spadefoot, it is possible to make some esti-

[7] Rochester, C. J., K. L. Baumberger, and R. N. Fisher. 2017. Draft Final Western Spadefoot (*Spea hammondii*): Independent Scientific Advisor Report for the City of Santee Multiple Species Conservation Plan (MSCP) Subarea Plan.

> mates based on existing research. Baumberger's radio telemetry efforts (2013) documented that western spadefoot moved as far as 262 meters (860 feet) from the breeding pool site with an average distance from the pool of 40 meters (131 ft). The western spadefoot in her study had home ranges that ranged from 469 m^2 to 2,094 m^2 (Baumberger 2013).

By focusing its limited impact analysis entirely upon preservation of 0.26 acre of breeding pools, the EIR preparers have ignored the Western Spadefoot's other habitat requirements, including required aestivation sites. Failure to consider all of the spadefoot's life-history requirements leads to an incomplete, inadequate, and misleading CEQA impact analysis for this species.

"Edge Effects" of Development Near Spadefoot Habitats

The presence of Western Spadefoots in a given area relates to the level of nearby urban development, which may be thought of as the accumulation of edge effects and other urban impacts. Pages 7-10 of the USGS report discuss several classes of potential adverse effects upon Western Spadefoots that can result from nearby developed areas, as summarized in the following paragraphs.

Aseasonal flows of water due to irrigation of landscaping can disrupt the natural pattern of filling and drying of ponds, permitting invasion by such non-native aquatic species as the American Bullfrog (*Lithobates catesbeianus*) and African Clawed Frog (*Xenopus laevis*) that can prey upon Western Spadefoots.

Altered watershed dynamics resulting from increased impermeable surfaces within the developed areas can result in a more rapid transfer of rain into the aquatic system within the conserved area rather than the gradual accumulation of water as it seeps into the ground and makes its way through the system naturally. Runoff may also contain a higher contaminant load from vehicles, pet waste, and landscape activities. Altered hydrology can lead to increased sediment transport into the aquatic system, covering egg masses with silt. Spadefoot breeding sites are not typically within flowing drainages, and may not be impacted directly, but contaminants can be carried through the food chain and increased flows can alter the available habitats.

Introduced Argentine Ants (*Linepithema humile*) frequently extend from the urban edge into the first 200 m of undeveloped habitat, and where streams and creeks extend into the habitat, Argentine ants may also follow. Argentine Ants have been documented to alter both the native ant community and the overall invertebrate community, and Western Spadefoots feed mostly on insects. If Argentine Ants disrupt the local invertebrate community, this could impact availability of suitable prey for the Western Spadefoot. Additionally, small Western Spadefoot metamorphs could be vulnerable to attack by the omnivorous Argentine Ant.

Increased outdoor activity adjacent to new development typically involves hiking, cycling, and motorized off-road vehicle use, as well as increased presence of dogs, both on- and off-leash. Trash levels may also increase. These uses can prevent Western

Spadefoots from using otherwise suitable breeding ponds, can increase sedimentation through disturbance of pools, and can decrease the longevity of seasonal pools bikes and animals cross through them. Off-road vehicles can result in direct mortality of Western Spadefoots in the form of road-kill of adults out foraging along roads at night, and tadpoles can be killed by vehicles driving through pools and pushing water and tadpoles out of the pool.

The EIR fails to mention any of the development-related factors known to affect this species, both within and outside of breeding pools, and provides no spadefoot-focused mitigation measures designed to ensure the viability of the local population post-project. This is a serious deficiency of the EIR.

Western Spadefoot Habitat Requires Buffering from Development

In order to mitigate potential adverse effects associated with development edge upon Western Spadefoots, and to accommodate the movement of the toads between breeding ponds and upland aestivation sites, the USGS recommended that the City of Santee protect an **undeveloped buffer measuring 300 to 400 meters (980 to 1310 feet)** around Western Spadefoot breeding sites. Whatever buffer would remain outside of the vernal pools preserved on K-8 mesa, it would certainly be much smaller than that recommended by the USGS to allow persistence of Western Spadefoots. **We must therefore expect that the proposed actions would render the preserved pool complex unviable for maintaining the single identified population of Western Spadefoots on the site.**

Western Spadefoot Not an MSCP "Covered Species"

Because the Western Spadefoot is not an MSCP covered species, the MSCP does not provide mitigation via the habitat tier mitigation ratios. For this reason, the EIR for Village 13 must include a site-specific CEQA analysis, and not rely on the MSCP for mitigation credit. The DEIR identifies no mitigation for this significant impact.

Project Implementation Would Significantly Impact Western Spadefoot

As discussed herein, the DEIR's characterization of the project's anticipated effects on the Western Spadefoot is misleading and inadequate. The proposed actions would, in fact, foreseeably result in the loss of spadefoots from the site. This would be a significant impact not identified in the 2015 DEIR or the EIR sections being recirculated in 2019. The DEIR provides no credible basis for its determination that no significant impacts would remain after mitigation. These are major flaws in the project's CEQA documentation.

INADEQUATE TREATMENT OF GOLDEN EAGLE ISSUES

The project site occupies the southern part of the foraging area for a pair of Golden Eagles that occupy what biologists refer to as the "Cedar Canyon" territory in the Jamul

Mountains, north of the Village 13 site. Implementation of proposed Alternative H would directly impact 556 acres of foraging habitat for this pair. Last year, researchers for the US Geological Survey (USGS) published a habitat selection model for the Golden Eagle in San Diego County, as described in the following report:

- Tracey, J. A., Madden, M. C., Bloom, P. H., Katzner, T. E., and Fisher, R. N. 2018. *Golden Eagle (*Aquila chrysaetos*) habitat selection as a function of land use and terrain, San Diego County, California*. U.S. Geological Survey OpenFile Report 2018–1067. https://doi.org/10.3133/ofr20181067

The authors described the methods used to conduct its modeling of eagle habitat selection as a function of land use and terrain, and Appendix 1 to their report provides the "JAGS Model Specification." Other biologists and GIS specialists can follow the methods and model specified in Appendix 1 to answer specific questions about how different proposed land-use changes would impact the suitability of nearby areas as habitat for Golden Eagles. The County, despite being aware of the 2018 USGS model, did not utilize or refer to the model as part of CEQA analysis for the proposed Village 13 Alternative H project.

Per section 15355(b) of the CEQA Guidelines, "the cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects." As part of evaluating actions proposed at the nearby Village 14 site, Hamilton Biological worked with GIS specialists to model the combined effects of both projects on habitat suitability for Golden Eagles in the project vicinity.

Application of the USGS Model

The USGS model (described in Tracey et al. 2018) represents a powerful and relevant tool for evaluating the potential effects of different development scenarios in a given geographic area. This section describes the purpose of the USGS model and describes the methods and provides the results of this analysis.

Description of the USGS Model

The USGS report's Introduction describes the model's purpose:

> Beginning in 2014, the U.S. Geological Survey, in collaboration with Bloom Biological, Inc., began telemetry research on golden eagles (*Aquila chrysaetos*) captured in the San Diego, Orange, and western Riverside Counties of southern California. . . An important objective of this research is to develop habitat selection models for golden eagles. Here we provide predictions of population-level habitat selection for golden eagles in San Diego County based on environmental covariates related to land use and terrain.

Page 9 of the USGS report states:

> The model allows simultaneous inference at the individual and population levels. The goal with this initial version of the model was to assess the effects of land use and terrain on golden eagle

> habitat selection. Our results indicate strong avoidance of urban areas, moderate avoidance of exurban areas, and avoidance of a buffer around these landscape elements.

Methods

I collaborated with GIS specialists Salvador Contreras and Jennifer Mongolo of Streamscape Environmental, LLC, to complete this analysis evaluating a total of four potential development scenarios in the Proctor Valley area. Scenario 1 and Scenario 3 considered implementation of the proposed Village 14 and Planning Areas 16/19 project *independent of proposed actions at Village 13*. Scenarios 2 and 4, however, evaluated the Village 13 project in conjunction with two proposed development alternatives in Proctor Valley:

Scenario 2: Implementation of the Otay Village 13 project, as proposed in 2015, together with implementation of the Otay Village 14 and Planning Areas 16/19 project, as proposed.

Scenario 4: Implementation of the Otay Village 13 project, as proposed in 2015, together with implementation of the Otay Village 14 and Planning Areas 16/19 project, Land Exchange Alternative.

Note that, since Alternative H to the Village 13 project would impact a smaller area than would the project proposed in 2015, the impacts to the local eagle pair would be somewhat reduced. Nevertheless, the modeling exercise does provide useful analysis on the predicted cumulative effects of the two projects on Golden Eagles in the project vicinity.

Application of the USGS model involved the following steps:

1. Create shapefiles of proposed development footprints for each development scenario to be analyzed.
2. Convert the shapefiles to binary rasters (e.g. 1 = developed, 0 = not developed) with the same cell size as used in the model.
3. Use these new rasters to modify the existing binary raster of urban development footprint (based on 2014 SanGIS land use data) for each scenario.
4. Apply the habitat selection model using each new binary rasters using R-studio.
5. Import resulting "probability of habitat selection" rasters into ESRI ArcMap software to build map layout.

During this process, Mr. Contreras and Ms. Mongolo conferred in depth with Dr. Jeff Tracey, the lead author of the USGS model, to ensure that they were using and interpreting the model correctly and inputting the correct variables to ensure accurate results.

Results

The figures on the following pages show the model's outputs for the existing condition and the two potential development scenarios involving Village 13. These are referred to as Scenario 2 and Scenario 4; Scenarios 1 and 3, involving only the Village 14 and Planning Areas 16/19 project and one of its alternatives, are not included here.

The specified color gradients in the following figures correspond to the modeled suitability of habitat for Golden Eagles; areas of higher habitat suitability are more likely to be selected for use by eagles compared with areas of lower suitability.

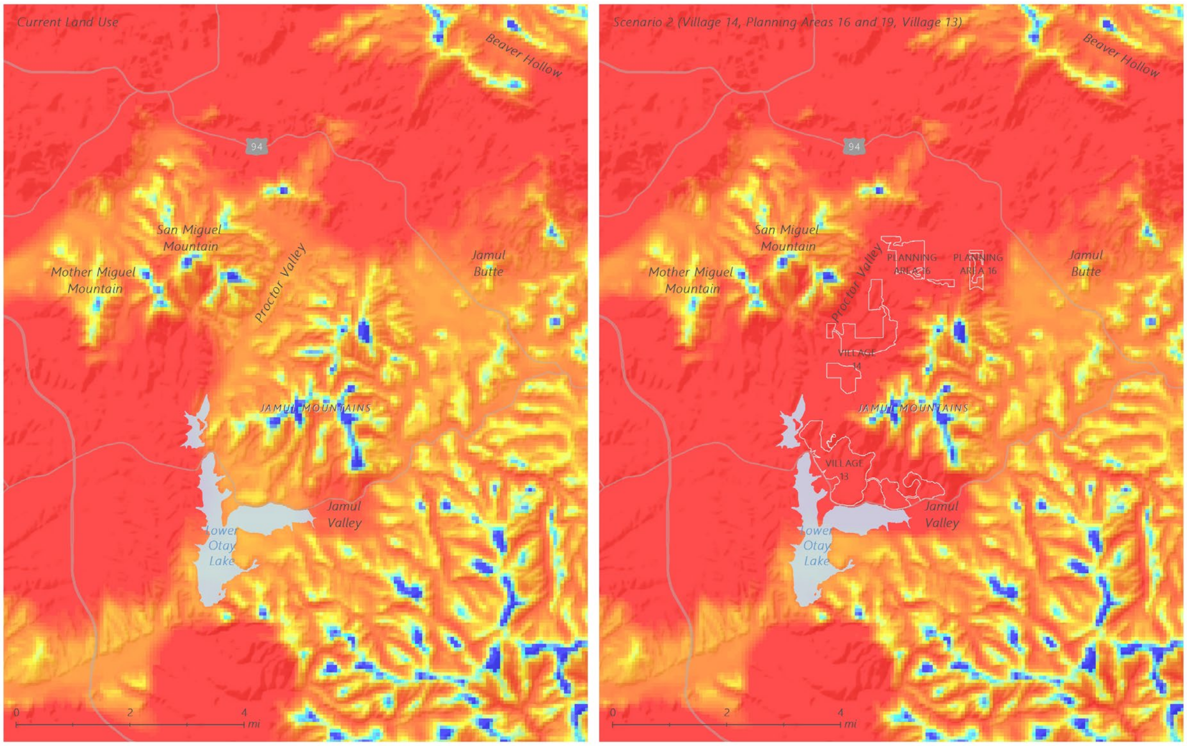
Scenario 2: Village 13 Project Plus Village 14, As Proposed

The figure below shows the cumulative impacts of the proposed Village 13 project on Golden Eagle habitat suitability when considered together with impacts expected to accompany implementation of the proposed Village 14 and Planning Areas 16/19 project, located a short distance north in Proctor Valley. These projects would substantially reduce the area of suitable foraging habitat for the Cedar Canyon Golden Eagle nesting territory, located in the Jamul Mountains north of the Village 13 site. They would also cumulatively impact the Rancho San Diego eagle territory, located at San Miguel Mountain west of Proctor Valley. The MSCP assumed that the Rancho San Diego territory would remain viable after build-out in the local area, but modeling shows that this territory would almost certainly be unviable under Scenario 3. The contribution of the proposed Village 13 project, including Alternative H, to potentially significant cumulative impacts to eagle foraging habitat in the local area is not addressed in the MSCP or in the EIR for Village 13. A larger version of Scenario 2 is attached to this letter.

Effect of proposed development on the probability of selection and habitat suitability for the golden eagle (Aquila chrysaetos) in the Jamul - Proctor Valley Corridor.

High
PROBABILITY
None

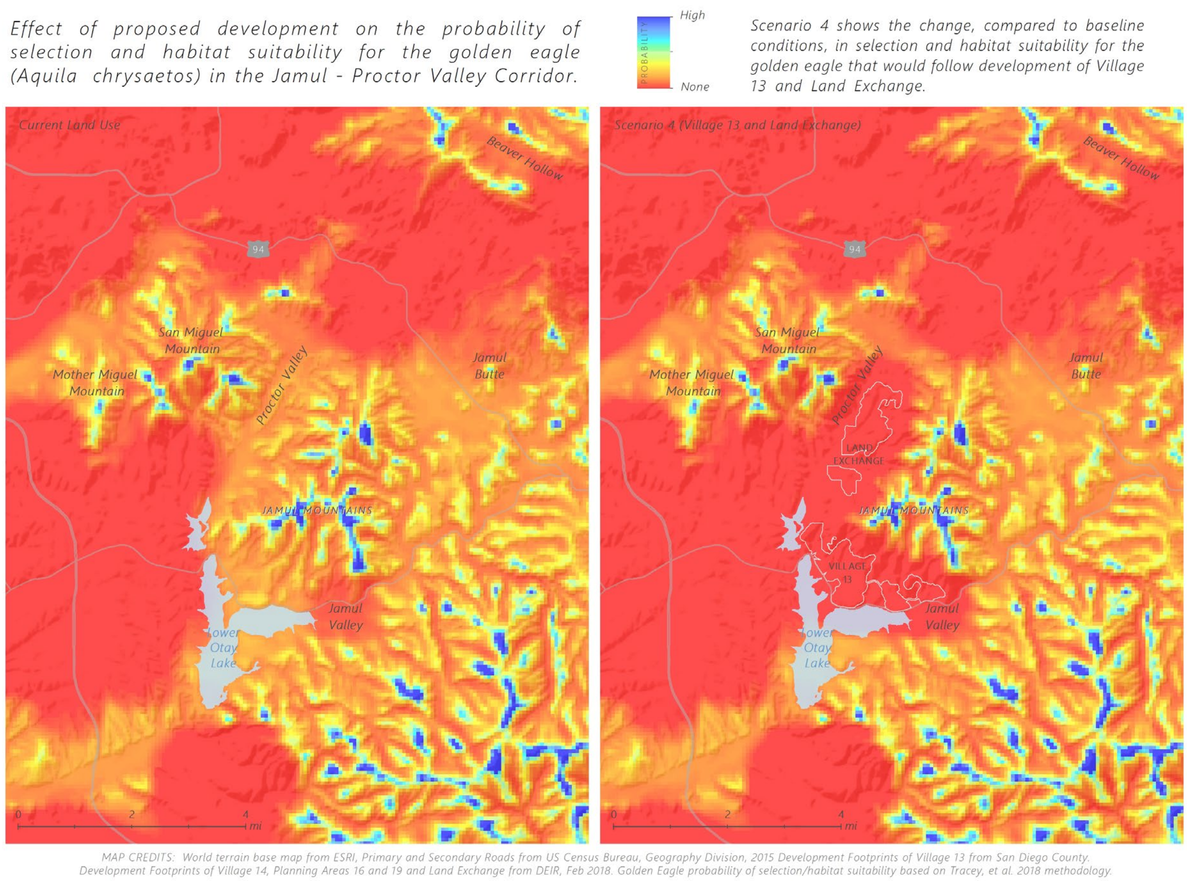
Scenario 2 shows the change, compared to baseline conditions, in selection and habitat suitability for the golden eagle that would follow development of Villages 13, 14 and Planning Areas 16 and 19.



MAP CREDITS: World terrain base map from ESRI, Primary and Secondary Roads from US Census Bureau, Geography Division, 2015 Development Footprints of Village 13 from San Diego County. Development Footprints of Village 14, Planning Areas 16 and 19 and Land Exchange from DEIR, Feb 2018. Golden Eagle probability of selection/habitat suitability based on Tracey, et al. 2018 methodology.

Scenario 4: Land Exchange Alternative Plus Proposed Village 13 Project

The figure below shows the cumulative impacts of the proposed Village 13 project on Golden Eagle habitat suitability when considered together with impacts expected to accompany implementation of the proposed Village 14 and Planning Areas 16/19 project, Land Exchange Alternative, located a short distance north in Proctor Valley. These projects would substantially reduce the area of suitable foraging habitat for the Cedar Canyon Golden Eagle nesting territory, located in the Jamul Mountains north of the Village 13 site. They would also cumulatively impact the Rancho San Diego eagle territory, located at San Miguel Mountain west of Proctor Valley. The MSCP assumed that the Rancho San Diego territory would remain viable after build-out in the local area, but modeling shows that this territory would almost certainly be unviable under Scenario 3. The contribution of the proposed Village 13 project, including Alternative H, to potentially significant cumulative impacts to eagle foraging habitat in the local area is not addressed in the MSCP or in the EIR for Village 13. A larger version of Scenario 4 is attached to this letter.



CONCLUSION

I appreciate the opportunity to provide this analysis. If you have questions, please call me at (562) 477-2181 or send e-mail to robb@hamiltonbiological.com.

Sincerely,

Robert A Hamilton

Robert A. Hamilton
President, Hamilton Biological, Inc.

316 Monrovia Avenue
Long Beach, CA 90803
562-477-2181
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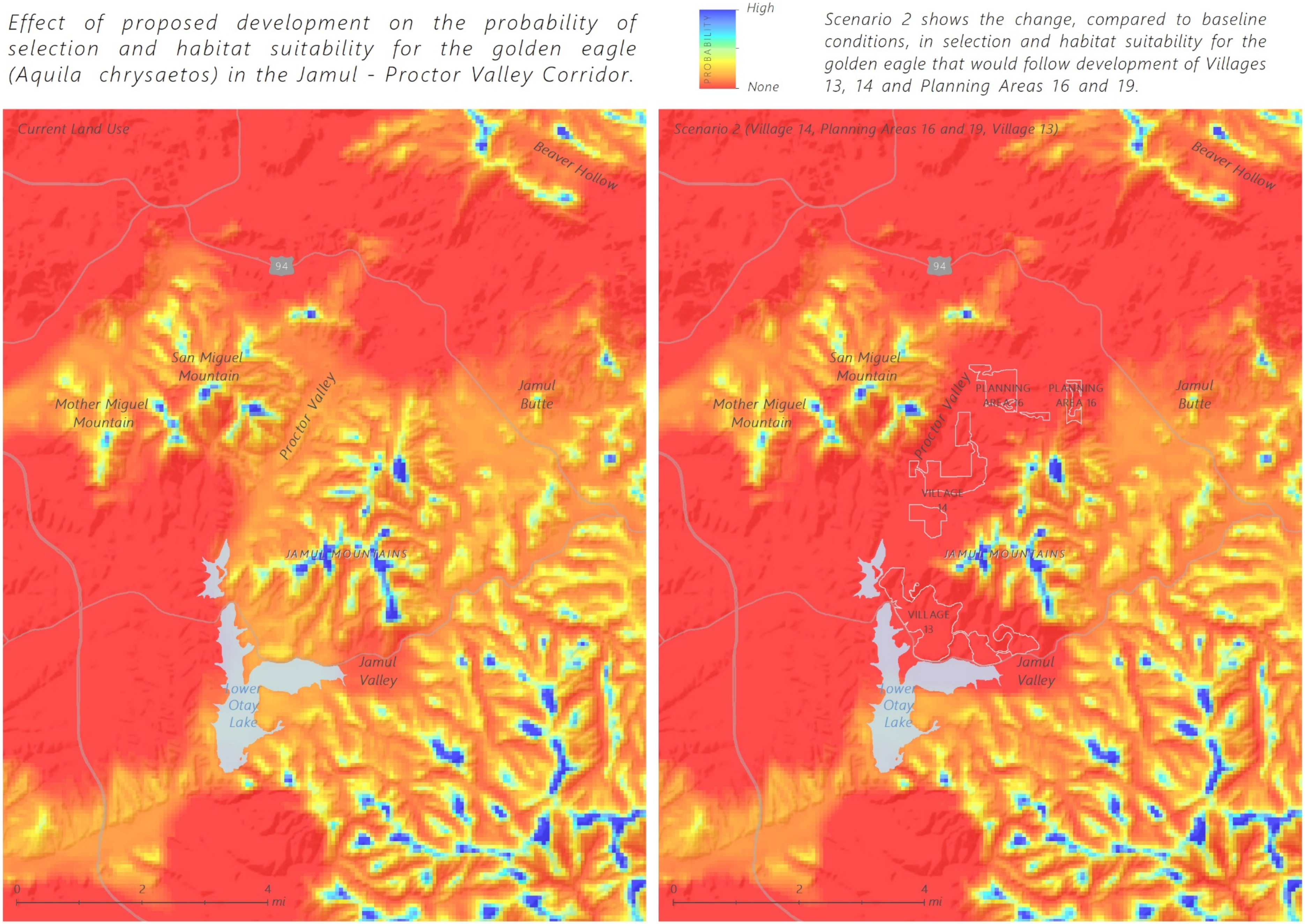
Attached: Scenario 2
Scenario 4
Draft Amendment I to the Quino Checkerspot Butterfly Recovery Plan

1122611.1

Effect of proposed development on the probability of selection and habitat suitability for the golden eagle (Aquila chrysaetos) in the Jamul - Proctor Valley Corridor.

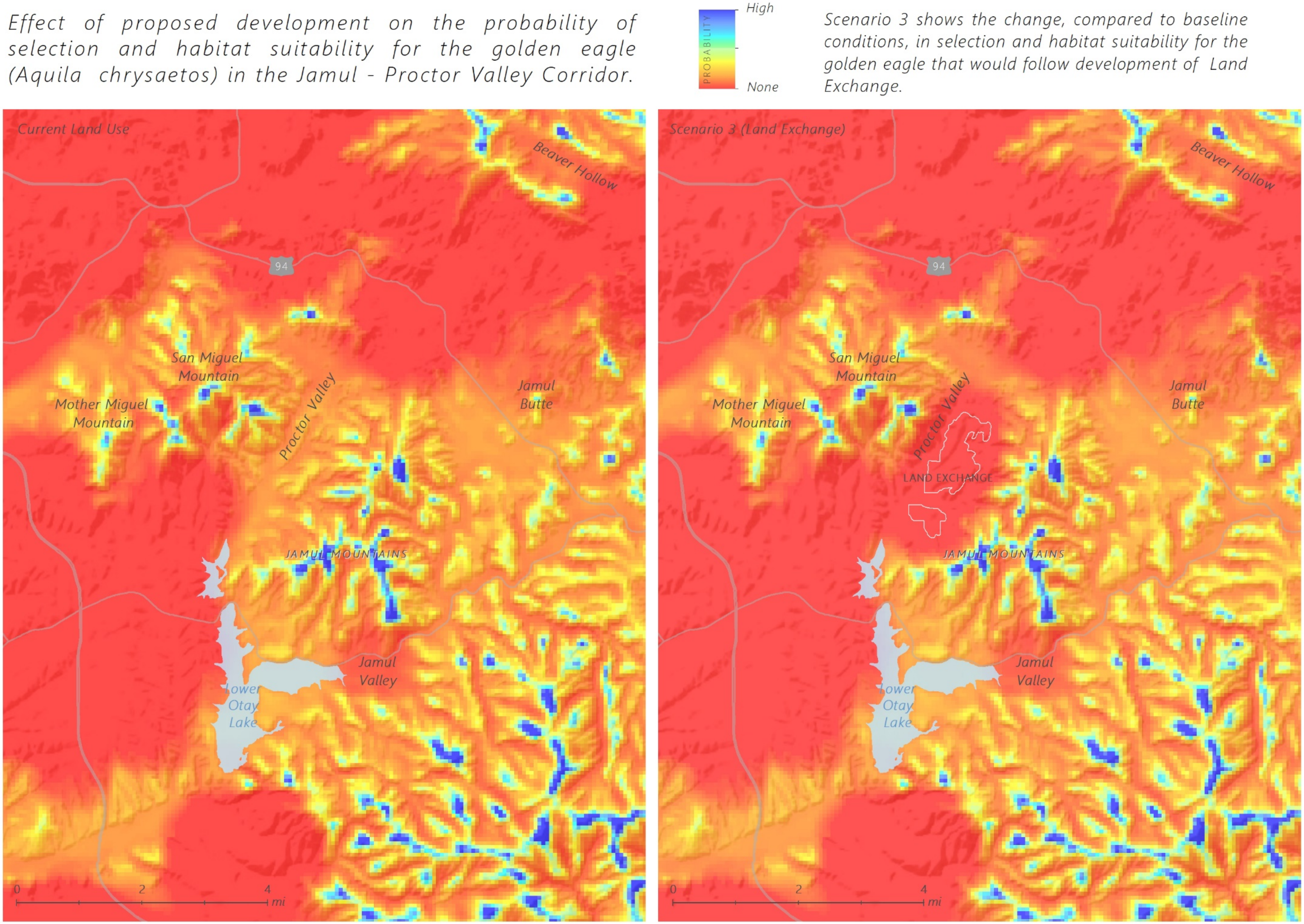
Scenario 2 shows the change, compared to baseline conditions, in selection and habitat suitability for the golden eagle that would follow development of Villages 13, 14 and Planning Areas 16 and 19.



MAP CREDITS: World terrain base map from ESRI, Primary and Secondary Roads from US Census Bureau, Geography Division, 2015 Development Footprints of Village 13 from San Diego County. Development Footprints of Village 14, Planning Areas 16 and 19 and Land Exchange from DEIR, Feb 2018. Golden Eagle probability of selection/habitat suitability based on Tracey, et al. 2018 methodology.

Effect of proposed development on the probability of selection and habitat suitability for the golden eagle (Aquila chrysaetos) in the Jamul - Proctor Valley Corridor.

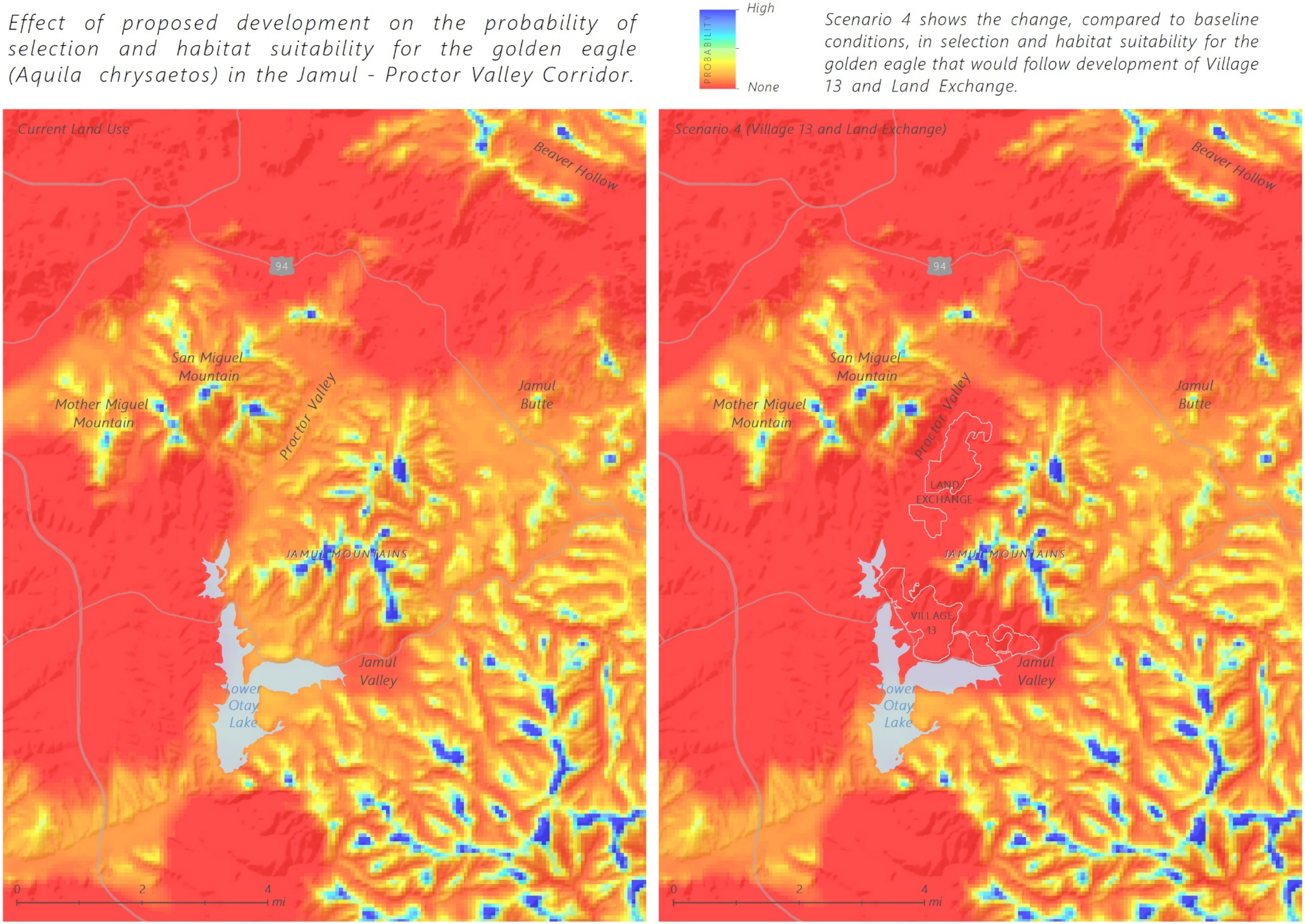
Scenario 3 shows the change, compared to baseline conditions, in selection and habitat suitability for the golden eagle that would follow development of Land Exchange.



MAP CREDITS: World terrain base map from ESRI, Primary and Secondary Roads from US Census Bureau, Geography Division, 2015 Development Footprints of Village 13 from San Diego County. Development Footprints of Village 14, Planning Areas 16 and 19 and Land Exchange from DEIR, Feb 2018. Golden Eagle probability of selection/habitat suitability based on Tracey, et al. 2018 methodology.

Effect of proposed development on the probability of selection and habitat suitability for the golden eagle (Aquila chrysaetos) in the Jamul - Proctor Valley Corridor.

Scenario 4 shows the change, compared to baseline conditions, in selection and habitat suitability for the golden eagle that would follow development of Village 13 and Land Exchange.



MAP CREDITS: World terrain base map from ESRI, Primary and Secondary Roads from US Census Bureau, Geography Division, 2015 Development Footprints of Village 13 from San Diego County. Development Footprints of Village 14, Planning Areas 16 and 19 and Land Exchange from DEIR, Feb 2018. Golden Eagle probability of selection/habitat suitability based on Tracey, et al. 2018 methodology.

Recovery Plan for Quino checkerspot butterfly (*Euphydryas editha quino*)
[Click here to view document]

Original Approved: August 11, 2003
Original Prepared by: Alison Williams-Anderson

DRAFT AMENDMENT 1

We have identified best available information that indicates the need to amend recovery criteria for the Quino checkerspot butterfly (Quino) since the recovery plan was completed. In this proposed modification we add delisting criteria and recovery actions. The proposed modification is shown as an appendix that supplements the recovery plan, superseding only the following sections: **EXECUTIVE SUMMARY** (pp. v–vii), Recovery Criteria (pp. 92–95), and select definitions in Appendix IV (see below; pp. 21, 22, 35) of the recovery plan (Service 2003).

For
U.S. Fish and Wildlife Service
Region 8
Carlsbad, California

March 2019

METHODOLOGY USED TO COMPLETE THE RECOVERY PLAN AMENDMENT

The original recovery plan (Service 2003) was authored by Service staff (Alison Williams-Anderson) and an official Technical Recovery Team of seven scientific experts. At the time the Recovery Plan was developed, the Technical Recovery Team found that there was insufficient information about the biology of the species to establish criteria and timeframes for delisting. Research activities needed to establish delisting criteria were identified as: "…survey areas between and around occurrence complexes to determine where there is intervening and/or additional landscape connectivity; map habitat patch distributions; monitor habitat loss; conduct preliminary modeling of metapopulation dynamics; investigate key natural history questions and threats." Through Service partnership activities such as the San Diego National Wildlife Refuge Quino Augmentation Project, and research funded through mitigation projects and grant programs, we have made strides toward meeting the research needs for delisting criteria development, especially in the Southwest San Diego Recovery Unit (Figure 2). For example, areas within and among occurrence complexes are being surveyed on a project-by project basis, and areas where intervening and/or additional landscape connectivity is needed are being identified. We are mapping habitat patch distributions, tracking habitat loss through GIS databases, developing a preliminary metapopulation model, and investigating key natural history questions and threats through a rearing and population augmentation program.

This document presents updated distribution information and provides quantitative delisting criteria. The document will be made available for public comment to ensure the best possible scientific and commercial data are used to support the criteria described herein. This amendment will also undergo peer review. These coordinated efforts helped to develop new quantitative criteria for the recovery plan that will better serve us as we work to recover the Quino checkerspot butterfly.

ADEQUACY OF RECOVERY CRITERIA

Section 4(f)(1)(B)(ii) of the Endangered Species Act (Act) requires that each recovery plan shall incorporate, to the maximum extent practicable, "objective, measurable criteria which, when met, would result in a determination…that the species be removed from the list." Legal challenges to recovery plans (see Fund for Animals v. Babbitt, 903 F. Supp. 96 (D.D.C. 1995)) and a Government Accountability Audit (GAO 2006) also have affirmed the need to frame recovery criteria in terms of threats assessed under the five delisting factors.

Synthesis

New Scientific Information and Changed Circumstances

Below is a summary list of new scientific information and changed circumstances, which will help inform amended criteria and actions.

- New Quino observation data resulting in new and merged occurrence complexes, and permanent loss of occurrences due to development and isolation. Compare Service 2003 (Figure 3) to Figure 1.

- Recent extended drought resulting in low adult numbers across the species' range (starting in 2012, interrupted in 2017, continuing in 2018).
- San Diego National Wildlife Refuge Quino Augmentation project: The objective of this project is to augment occurrence complexes on the San Diego National Wildlife Refuge and to identify methods needed to monitor and manage Quino populations in San Diego County and to reintroduce populations across the range in the future. To date, there have been three releases on the refuge, with apparent establishment and reproduction at one site at least (Strahm *et al.* 2018). The project has also been developing a metapopulation model to identify key population dynamic parameters and habitat patch configurations required to support resilient metapopulations.
- The conclusions of post-recovery plan peer-reviewed publications analyzing climate change effects and evidence of range shift specifically for Quino (Preston *et al.* 2008, entire; Preston *et. al* 2012, entire; Parmesan *et al.* 2014, entire) all support the "fundamental conservation message" that connectivity among habitats and protected areas connected to higher elevation habitats is required for species climate change adaptation.
- Advances including: conservation achieved; knowledge gained, and partnerships and programs established and strengthened.

Since the 2003 Recovery Plan, additional occurrence complexes have been discovered and some expanded, while others have been lost (Table 1), or have significantly reduced footprints. As was the concern at the time of recovery plan publication (Service 2003, pp. 28–30), the former Northwest Riverside subsequently hit an extirpation threshold, where resilience was irretrievably lost and all occurrence complexes within the unit were extirpated (including the Harford Springs Core Occurrence Complex). The entire Northwest Riverside Recovery Unit is now believed to be unoccupied, and not likely to be recolonized without assistance. Furthermore, one of the two core occurrence complexes in the Southwest Riverside Recovery Unit (Warm Springs Creek) may be extirpated. Despite planning efforts to enhance resilience such as the soon-to-be constructed Quino habitat bridge that will enhance landscape connectivity, recovery unit viability is compromised due to loss of landscape and ecological connectivity (Table 1; Figure 2). These two recovery units are not only highly affected by climate change and drought, but habitat loss has been concentrated in these areas. In western Riverside County approximately a dozen populations are believed to have been permanently extirpated by habitat loss, isolation, or both since recovery plan publication.

The recovery plan hypothesized that in 2003 the species may have reached the latest 10- to 20-year population density and distribution peak, and discussed that Quino densities remained far below what they were in the late 1970s. It states "It is likely that there will be yet another drought-induced [Quino] crash during the next 5 to 10 years, such as the ones that occurred in the 1980's and …the 1960's." (Service 2003, p. 31). Not surprisingly, the current drought that has much reduced Quino abundance and detectability through most of the species range (Service unpublished data) started in approximately 2012, 10 years after that prediction was made. Therefore it is likely the species will need assistance to reestablish or maintain population resilience across its post-listing range and achieve recovery.

Finally, we have noticed that most of the largest and apparently most resilient Quino populations are associated with relatively large, long-established reservoirs mostly surrounded by hills. Specifically: Lake Skinner (established in 1973; Skinner/Johnson Core Occurrence Complex); Vail Lake (established in 1948; Oak Mountain Core occurrence complex); and Lower Otay Lake (established in 1934; Otay Core Occurrence Complex). This is not likely a coincidence, as such water bodies ameliorate the effects of drought on Quino habitat in the immediate vicinity due to the "lake effect," a well-documented climate phenomenon where bodies of fresh water, especially those with hilly surroundings, increase humidity and decrease temperatures of surrounding land areas (e.g. Condi and Webster 1997, entire; Mohamed Degu *et al.* 2011, entire, Ekhtiari *et al*. 2017, entire; Theeuwes *et al*. 2013, entire). As described in the recovery plan (Service 2003, pp. 25, 50, 55, 86, 87, 89), through its large thermal mass, the ocean buffers coastal habitat from high temperature and low humidity extremes. On a smaller scale lakes have a similar effect, retaining heat and cold, and re-releasing them when temperature changes occur. Therefore we believe it is essential to focus conservation and management efforts first on those habitat patches within core occurrence complexes proximal to large water bodies, which likely contribute to population resilience.

Although Tribal lands occur within recovery unit boundaries and may harbor core populations, in accordance with the President's memorandum of April 29, 1994, Government-to-Government Relations with Native American Tribal Governments (59 FR 22951), E.O. 13175, the Department of the Interior's manual at 512 DM 2, Secretarial Order 3206 of June 5, 1997 (American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act), and S.O. 3335 of August 20, 2014 (Reaffirmation of the Federal Trust Responsibility to Federally Recognized Indian Tribes and Individual Indian Beneficiaries), we acknowledge that Tribal lands are not subject to the same controls as Federal public lands, are not part of the public domain, and are not subject to Federal public land laws. We recognize our responsibilities to work directly with Tribes in developing programs for healthy ecosystems, including recovery planning, and our responsibility to consult with federally recognized tribes on a government-to-government basis. In recognition of Tribal rights, we will coordinate recovery planning with non-Tribal stakeholders and cooperate with tribes to implement this recovery plan in a manner that minimizes, or if possible, avoids social, cultural, and economic impacts to Tribal communities.

Table 1. Quino checkerspot butterfly occurrence complexes within and outside of existing Recovery Units, 1970-present, associated with remaining habitat

Occurrence Complex (core status)[1]	**Date last observed**	**Location:** ***RU***	**Current threats**[2] **(Estimated status)**
1. Lake Mathews	1982	South of Lake Mathews: *NW Riverside*	Climate change effects, habitat destruction, degradation, isolation, fragmentation, nonnative plant invasion, drought, and fire. (Extirpated)
2. Harford Springs (core)	1998	SW of Lake Mathews: *NW Riverside and outside*	Same as above (Extirpated)
3. Canyon Lake	2002	W of Canyon Lake: *NW Riverside*	Same as above. (Extirpated)
4. N Warm Springs Creek	2003	N of the City of Murrieta: *SW Riverside*	Same as above. (Extirpated)
5. Warm Springs Creek (Core)	2010	N of the City of Murrieta: *SW Riverside*	Same as above. (Extirpated)
6. W Domenigoni Valley	2001	SW of Domenigini Valley Reservoir: *SW Riverside*	Climate change effects, habitat destruction, degradation, nonnative plant invasion, drought, and fire. (Extant)
7. E Domenigoni Valley	2011	SE of Domenigini Valley Reservoir: *SW Riverside*	Same as above. (Extant)
8. Skinner/ Johnson (Core)	2013	N, E, and S of Lake Skinner: *SW Riverside and outside*	Same as above. (Extant)
9. Pauba Valley	1998	W of Oak Mountain: *S Riverside*	Climate change effects, habitat destruction, degradation, and fragmentation, nonnative plant invasion, drought, and fire. (Extirpated)
10. Black Hills	1992	N of Oak Mountain: *S Riverside*	Climate change effects, habitat destruction, degradation, and fragmentation, nonnative plant invasion, drought, and fire. (Extant)

Occurrence Complex (core status)[1]	**Date last observed**	**Location:** ***RU***	**Current threats**[2] **(Estimated status)**
11. Oak Mountain/ Vail Lake (Core)	2017	Surrounding Vail Lake: *S Riverside*	Same as above. (Extant)
12. Sage (Core)	2004	Surrounding the community of Sage: *S Riverside*	Same as above. (Extant)
13. Rocky Ridge	1997	S of community of Sage: *S Riverside*	Same as above. (Extant)
14. Wilson Valley (Core)	2013	NW of Wilson Valley: *S Riverside*	Same as above. (Extant)
15. Aguanga/ Dameron Valley (Core)	2010	Near community of Aguanga: *S Riverside*	Same as above. (Extant)
16. Oak Grove	1992	Community of Oak Grove: *S Riverside*	Climate change effects, habitat destruction, degradation, and fragmentation, nonnative plant invasion, and fire. (Extant)
17. Brown Canyon	1999	SE of the community of Hemet: *S Riverside*	Habitat degradation, nonnative plant invasion, drought, and fire. (Extant)
18. N Rouse Ridge	2005	Rouse Ridge: *S Riverside and S Riverside/N San Diego*	Nonnative plant invasion, grazing, and fire. (Extant)
19. S Fork Trail	2009	S of State Route 78, NW of Lake Hemet: *S Riverside/N San Diego and outside*	Same as above. (Extant)
20. Hurkey Creek	2009	East of community of Mountain Center: *Outside*	Nonnative plant invasion and fire. (Extant)
21. Horse Creek	2012	SE of Bautista Spring: *S Riverside and S Riverside/N San Diego*	Same as above. (Extant)

Occurrence Complex (core status)[1]	**Date last observed**	**Location:** ***RU***	**Current threats**[2] **(Estimated status)**
22. Garner Valley (Core)	2011	Vicinity of and NE of Garner Valley: *S Riverside/N San Diego and outside*	Habitat destruction, degradation, and fragmentation, nonnative plant invasion, and fire. (Extant)
23. Bautista Road (Core)	2008	N of the community of Anza: *S Riverside/N San Diego*	Habitat destruction, degradation, and fragmentation, nonnative plant invasion, and fire. (Extant)
24. Table Mountain Truck Trail	2011	East of Ramona Tribal reservation: *S Riverside/N San Diego*	Same as above. (Extant)
25. Thomas Mountain	2009	S slope Thomas Mt.: *S Riverside/N San Diego*	Nonnative plant invasion, grazing, and fire. (Extant)
26. Lookout Mountain	2003	S Garner Valley: *S Riverside/N San Diego*	Habitat destruction, degradation, and fragmentation, grazing nonnative plant invasion, and fire. (Extant)
27. Cave Rocks	2016	The community of Anza: *S Riverside/N San Diego*	Same as above. (Extant)
28. Cahuilla Creek	2003	Near Cahuilla Tribal Offices and Casino[3]: *S Riverside/N San Diego*	Habitat destruction, degradation, and fragmentation, nonnative plant invasion, and fire. (Extant)
29. Barbara Trail	2008	SW of the community of Anza: *S Riverside and S Riverside/N San Diego*	Same as above. (Extant)
30. Tule Peak (Core)	2016	S of the community of Anza: *S Riverside/N San Diego*	Same as above. (Extant)
31. Terwilliger Valley (Core)	2009	S E of the community of Anza: *S Riverside/N San Diego*	Same as above. (Extant)
32. Holcomb	2018	NE of the community of Holcomb Village:	Climate change effects; nonnative plant invasion, and fire. (Extant)

Occurrence Complex (core status)[1]	**Date last observed**	**Location: *RU***	**Current threats[2] (Estimated status)**
		S Riverside/N San Diego	
33. Iron Spring Canyon	1998	S of the community of Anza: *S Riverside/N San Diego*	Habitat degradation, nonnative plant invasion, and fire. (Extant)
34. Palomar Divide	2015	E of Palomar Mt.: *S Riverside/N San Diego and outside*	Climate change effects; nonnative plant invasion, and fire. (Extant)
35. Fink Road	2011	SE of Palomar Mt.: *Outside*	Same as above. (Extant)
36. Cañada de San Vicente	2017	S of community of Ramona: *Outside*	Climate change effects, nonnative plant invasion, drought, and fire. (Extant)
37. San Vicente	2016	W of San Vicente Reservoir: *Outside*	Same as above. (Extant)
38. Sycamore Canyon	2005	Sycamore Canyon Open Space Preserve: *Outside*	Climate change effects, nonnative plant invasion, drought, and fire. (Extant)
39. Fanita Ranch	2018	N of the City of Santee: *Outside*	Climate change effects, habitat destruction, degradation, and fragmentation, nonnative plant invasion, drought, and fire. (Extant)
40. Miramar (Core)	2018	Central Marine Corps Air Station, Miramar: *Outside*	Climate change effects, habitat degradation, nonnative plant invasion, drought, and fire. (Extant)
41. Mission Trails Park	2008	Mission Trails Regional Park: *Outside*	Climate change effects, habitat degradation, nonnative plant invasion, drought, and fire. (Extant)
42. Alpine	2010	Wright's field in the community of Alpine: *Outside*	Climate change effects, habitat destruction, degradation, and fragmentation, nonnative plant invasion, and fire. (Extant)
43. Willits Rd	2004	SW of the community of Alpine: *Outside*	Climate change effects, habitat destruction, degradation, and fragmentation, nonnative plant invasion, drought, and fire. (Extant)

Occurrence Complex (core status)[1]	Date last observed	Location: *RU*	Current threats[2] (Estimated status)
44. Dehesa	2017	East of Sycuan Golf Resort: *Outside*	Same as above. (Extant)
45. Sycuan Peak	2018	Sycuan Peak: *Outside*	Climate change effects, nonnative plant invasion, drought, and fire. (Extant)
46. Dictionary Hill	2017	Dictionary Hill between the communities of La Presa and Spring Valley *Outside*	Climate change effects, habitat degradation and isolation, nonnative plant invasion, drought, and fire. (Extant)
47. Otay (Core)	2018	W and N Otay Mountain foothills, Otay Lakes, Jamul Mountains, E of Sweetwater Reservoir: *SW San Diego and Outside*	Climate change effects, habitat destruction, degradation, and fragmentation, nonnative plant invasion, drought, and fire. (Extant)
48. W Otay Valley	2004	N of Otay Mesa: *SW San Diego*	Same as above. (Extant)
49. Jamul Butte	2004	N of Jamul Butte near community of Jamul: *Outside*	Climate change effects, habitat destruction, degradation, and fragmentation, nonnative plant invasion, and fire. (Extant)
50. W Barrett Lake (Core)	2017	W of Barrett Lake: *Outside*	Same as above. (Extant)
51. Round Portrero	2010	SE of Barrett Lake: *Outside*	Same as above. (Extant)
52. SW Morena	2017	SW of Lake Morena and Morena Butte: *Outside*	Same as above. (Extant)
53. Marron Valley (Core)	2018	W of Otay Mountain, Marron Valley: *SW San Diego and Outside*	Climate change effects, habitat degradation, nonnative plant invasion, and fire. (Extant)
54. Barrett Junction	2006	NW of Tecate Peak: *SW San Diego*	Same as above. (Extant)
55. Tecate	2009	N of the City of Tecate:	Same as above. (Extant)

Occurrence Complex (core status)[1]	**Date last observed**	**Location:** ***RU***	**Current threats**[2] **(Estimated status)**
		SW San Diego and Outside	
56. Cottonwood	2010	N McCain Valley Rd E of Cottonwood Campground *Outside*	Climate change effects, habitat degradation, nonnative plant invasion, and fire. (Extant)
57. Manzanita	2010	Manzanita Tribal Reservation: *Outside*	Climate change effects, habitat destruction, degradation, and fragmentation, nonnative plant invasion, and fire. (Extant)
58. La Posta	2010	La Posta Tribal Reservation: *Outside*	Same as above. (Extant)
59. NE Morena	2004	E of the community of Morena Village: *Outside*	Same as above. (Extant)
60. SE Morena	2004	E of the community of Morena Village: *Outside*	Same as above. (Extant)
61. Clover Flat	2018	E of the community of Morena Village, NE of the Community of Campo: *Outside*	Same as above. (Extant)
62. Campo (Core)	2010	Campo Tribal Reservation: *SE San Diego and outside*	Same as above. (Extant)
63. E Campo	2010	E of Campo Tribal Reservation: *Outside*	Same as above. (Extant)
64. S Campo	2009	SW of Campo Tribal Reservation: *Outside*	Same as above. (Extant)
65. Jacumba (Core)	2011	W of the community of Jacumba Springs: *SE San Diego*	Habitat degradation, destruction, and fragmentation, nonnative plant invasion, drought, and fire. (Extant)
66. SW Jacumba	1973	Three miles W of the community of Jacumba Springs *SE San Diego*	Same as above. (Extant)

Occurrence Complex (core status)[1]	**Date last observed**	**Location:** ***RU***	**Current threats[2] (Estimated status)**
67. Canyon City	2009	Vicinity of the community of Canyon City: *Outside*	Same as above. (Extant)
68. E Canyon City	2009	E of the community of Canyon City: *Outside*	Same as above. (Extant)

Abbreviations: E- east; I- Interstate; N- north; N/A- not applicable; ND- not documented, no historical records; RU –recovery unit; S- south; Unk- unknown; W- west.

[1]The area within overlapping one km radii of observation locations (or close to overlapping, but not including developed lands). Core status in recovery units is based on the size of the occurrence complex prior to habitat loss (area within overlapping 1 km radii).

[2]Climate-change effects are listed as a threat for all lower elevation occurrence complexes that are likely to experience decreasing habitat suitability (Preston *et al*. 2008, p. 2508); we used a break point of 2,500 feet (762 meters). Non-climate change-related drought is listed as a threat for all occurrence complexes with a 1961-1990 annual average precipitation below 15 inches (38 centimeters) (Oregon Climate Service 1995, p. 1).

[3]One adult in casino parking lot, may have been associated with nearby habitat or dispersing.

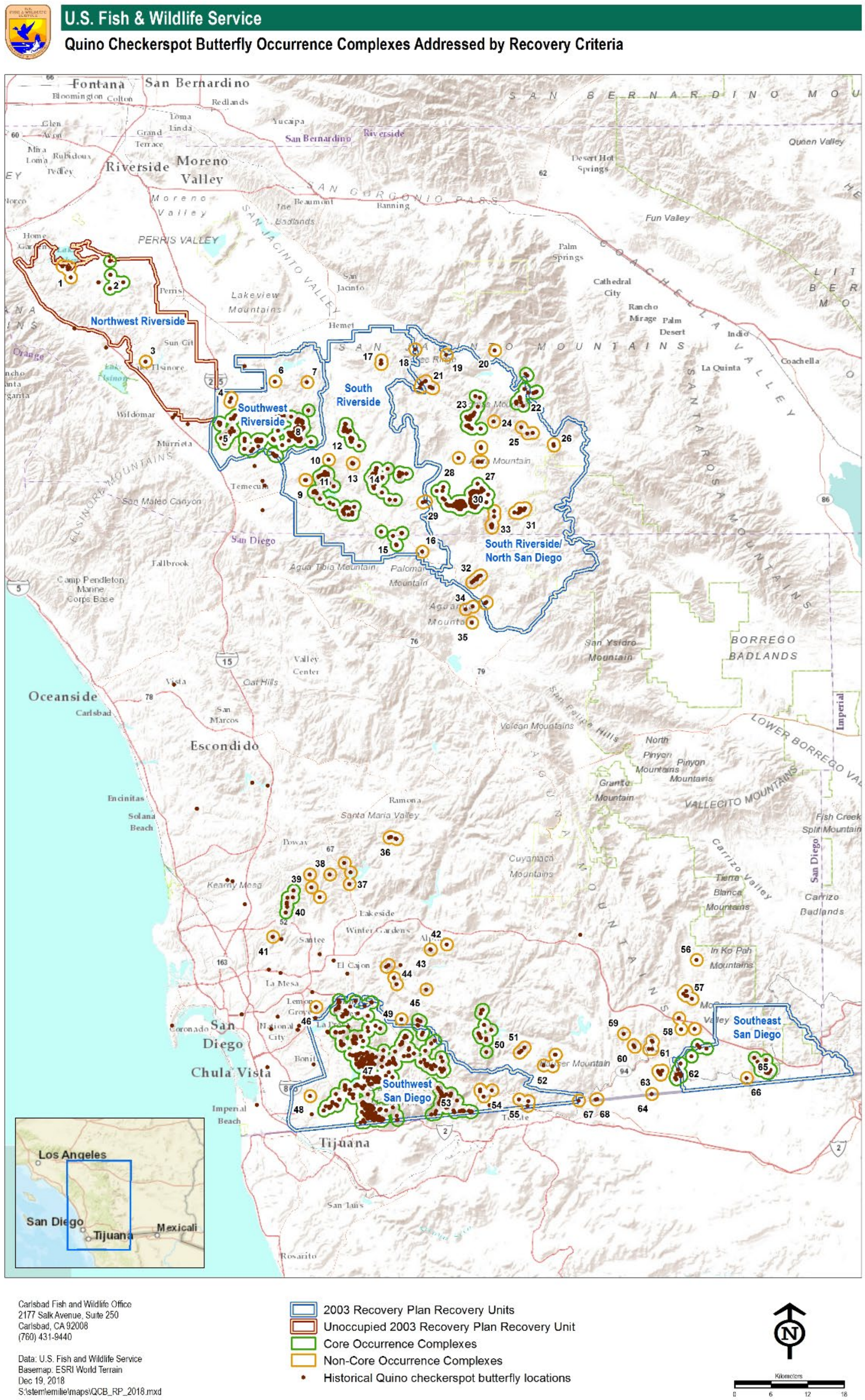


Figure 1. Quino checkerspot butterfly occurrence complexes and recovery units (mapped occurrence complexes areas are not all occupied at this time).

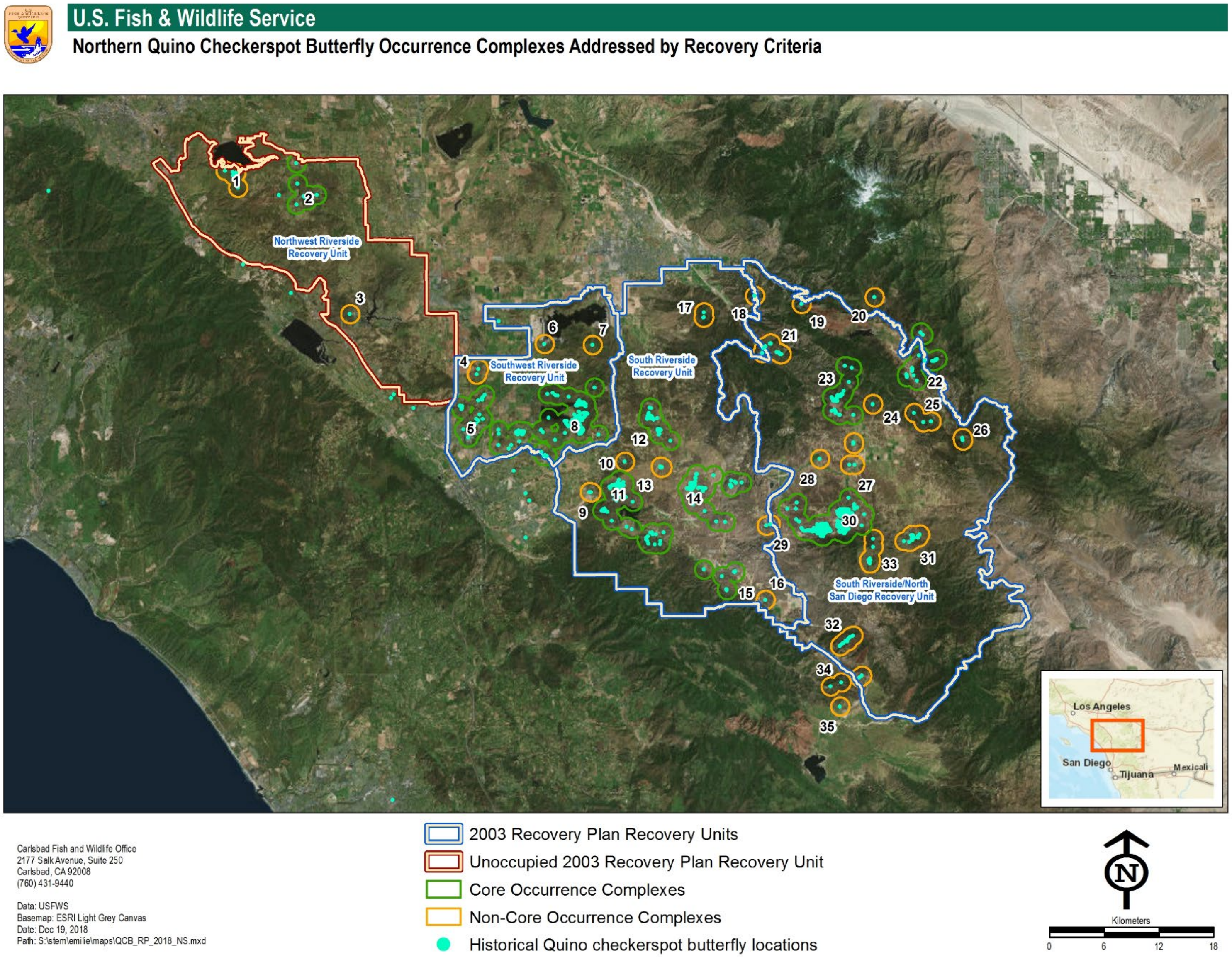


Figure 2. Quino checkerspot butterfly northern distribution and recovery units (mapped occurrence complex areas are not all occupied at this time).

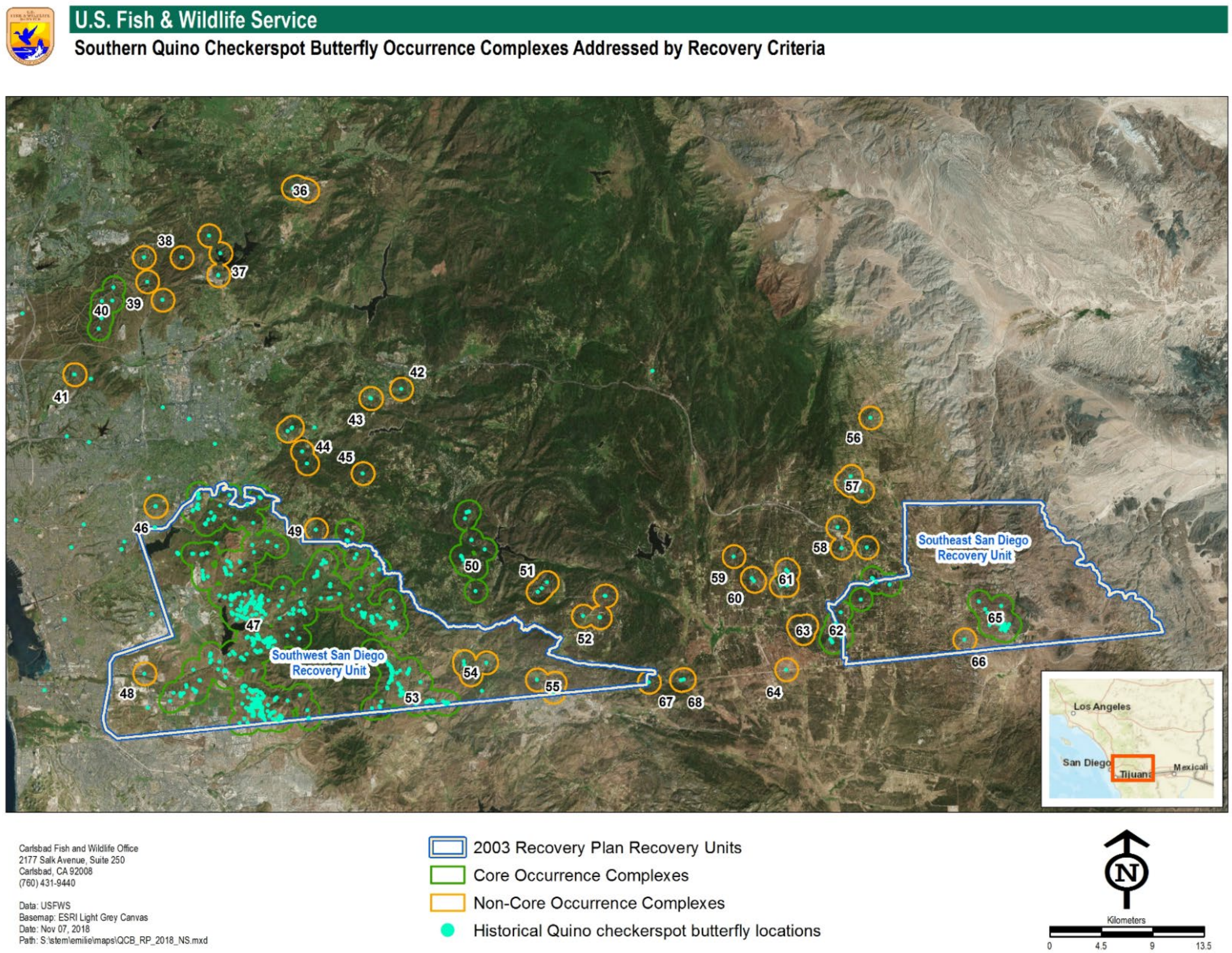


Figure 3. Quino checkerspot butterfly southern distribution and recovery units (mapped occurrence complex areas are not all occupied at this time).

AMENDED RECOVERY CRITERIA

Recovery criteria serve as objective, measurable guidelines to assist in determining when an endangered species has recovered to the point that it may be downlisted to threatened, or that the protections afforded by the Act are no longer necessary and it may be delisted. Delisting is the removal of a species from the Federal Lists of Endangered and Threatened Wildlife and Plants. Downlisting is the reclassification of a species from endangered to threatened. The term "endangered species" means any species (species, subspecies, or distinct population segment) which is in danger of extinction throughout all or a significant portion of its range. The term "threatened species" means any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Definition of terms for recovery criteria (primarily from Service 2003, pp. 21, 22, 35, and Appendix IV; updated clarification in brackets):

- <u>Ecological connectivity</u>: Undeveloped wildlands between two areas [supports rare long-distance movement of adults and populations of other species associated with Quino habitat, such as nectar source plants]. May or may not include landscape connectivity (connected habitat patches). Habitat areas or populations lacking ecological connectivity are considered completely isolated.
- <u>Habitat connectivity</u>: The degree [or lack] of fragmentation within a habitat patch. If roads or other development occurs within a habitat patch to the point that adults cannot move freely among resources, then one habitat patch may effectively become two or more with intervening areas becoming dispersal areas that support limited exchange between habitat patches. Habitat patches with poor connectivity are considered fragmented, and are generally prone to higher levels of ongoing degradation.
- <u>Habitat patch</u>: a set of relatively discrete larval host plant "micro-patches" and other resources, including nectar source plants and hilltops, within the typical flight range of adult Quino (up to 200 m (660 feet)).
- <u>Landscape connectivity</u>: The degree of linkage among habitat patches joined by dispersal areas [within a metapopulation distribution; undeveloped wildlands among proximal habitat patches create landscape connectivity].
- <u>Occurrence complex</u>: Spatially clustered Quino observation records. The largest ones are termed "core occurrence complexes" and [are believed to] represent current [or former] population density centers. Occurrence complexes represent current short-term documented local occupancy, probably within the greater distribution of extant metapopulations. Occurrence complexes are mapped using 1 km (0.6 mi) movement radii. Occurrences within approximately 2 km (1.2 mi) of each other are considered part of the same complex. [Core designation is based on total polygon area equal to or greater than the minimum occurrence complex size in the set of the largest occurrence complexes in each recovery unit.]
- <u>Population distribution</u>: The maximum long-term "footprint" (geographic area occupied at any time over approximately 50 years) of a panmictic population or metapopulation, as delineated and verified by research and monitoring. This area may include more than one occurrence complex, and metapopulation distributions are likely to be greater than the distribution of most occurrence complexes. Further research is required to determine the

specific population distributions required for resilience. For some core occurrence complexes and associated non-core complexes, habitat-based population distributions that meet the definition of critical habitat have already been mapped and defined by the Service. These are the areas used to map critical habitat units (Service 2008, p. 28838), prior to removal of excluded areas. For example, the Campo habitat-based population distribution includes the Campo Core occurrence complex, and Northeast Morena, Southeast Morana, Clover Flats, and East Campo non-core occurrence complexes).

- Population Resilience: In general, the ability of a Quino checkerspot butterfly population or metapopulation to survive periodic extreme and unpredictable environmental circumstances and persist long-term (50+ years) in an ecosystem not [irreparably] compromised by human impacts. For recovery monitoring purposes, population resilience is demonstrated if: [1) it demonstrates (through monitoring data) parameters specified by a metapopulation model predicting 90% likelihood of persistence for 50 years. That is, the proportion of model runs over a time period of 50 years resulting in metapopulation survival (termed surviving replicates) is no less than 90% percent. The type of data and metapopulation model used will be peer-reviewed and supported by the majority of peer reviewers; or] 2) a decrease in the number of habitat patches supporting larval development (as demonstrated by adult detectability) within an occurrence complex or population (metapopulation or pan-mictic population) is followed by increases of approximately equal, or greater, magnitude over a 15-year period without augmentation to span varying environmental conditions, or over a 10-year period [following] augmentation. The period following augmentation is shorter because augmentation increases the population size and it would include habitat restoration as needed, so there should be higher confidence in population resilience. These numbers are given in lieu of species-specific model parameters; they reflect estimated periods of metapopulation persistence based on expert opinion and published studies (Service 2003, pp. 24 and 25). The percent of patches occupied should be estimated by surveys in a sample of no less than 50 percent of the total number of habitat patches identified within a population distribution. Occupancy for the purpose of population resilience monitoring should include adults (reproductive individuals) and pre-diapause larval clusters (their offspring). The surveyed sample of habitat patches should be distributed as equally as possible across a metapopulation distribution to avoid error from possible correlation of suitability among proximal patches.

We provide recovery criteria for the Quino checkerspot butterfly as follows:

Downlisting Recovery Criteria

Downlisting criteria will be incorporated and remain current as in the Recovery Plan for the Quino checkerspot butterfly (Service 2003, pp. 92–95) with slight modifications as indicated with updated occurrence complex distributions (Table 1; Figures 1 and 2), and term definitions (see above).

Delisting Recovery Criteria
Delisting criteria apply to all occurrences referred to in the criteria below and identified in Table 1. The Quino Checkerspot butterfly will be considered for delisting when downlisting criteria are met and:

1. Reproduction is documented at least 4 years after reintroduction or last augmentation for the populations established in the Northwest Riverside Recovery Unit and in the footprint of the Warm Springs Creek Core Occurrence complex.

2. A total of 15 core occurrence complexes (not including the former Harford Springs or Warm Springs Creek core occurrence complexes) are conserved (protected and managed) in perpetuity, support resilient populations or metapopulations, and are ecologically connected via conserved lands to other core occurrence complexes (this includes ecological connectivity among the northern and southern portions of the range).

   Justification: Core occurrence complexes contribute the most to species viability. These are the largest geographically, and are therefore likely to belong to the most resilient metapopulations within the species range. Our conservation strategy is focused on preserving and maintaining all 15 known core occurrence complexes, thereby ensuring species representation across the species' range and habitat types. The largest core occurrence complexes are associated with large reservoirs and are considered crucial for species survival: Skinner/Johnson Core Occurrence Complex; Oak Mountain Core Occurrence Complex; and Otay Core Occurrence Complex. Core occurrence complexes should be ecologically connected in order to facilitate natural recolonization of extirpated populations and thereby maintain metapopulation resilience.

   If two new core occurrence complexes are identified or established that do not include Tribal land, with ecological connectivity (that also does not include Tribal land) to other core occurrence complexes, these areas can substitute for incomplete conservation and ecological connectivity of the Campo and Jacumba core occurrence complexes (Table 1, Figure 2).

3. Adequate (80 percent or greater of known) non-core occurrence complexes are conserved, as defined by the following:

   a. The 40 non-core occurrence complexes within existing ecological connectivity areas among core occurrence complexes (Table 1, Figures 2 and 3) support populations that demonstrate reproduction in the field for at least 4 years prior to delisting.

   b. In addition to those non-core occurrence complexes that contribute to ecological connectivity, non-core occurrence complexes with high-elevation montane influence (above 4000 ft (1219 m) in elevation) are conserved and managed with reproduction in the field at least 4 years prior to delisting.

c. Occurrence complexes and areas of occurrence complex distribution with marine influence (Coastal Terraces and Coastal Hills California Ecological Subregions; Figure 4) are conserved and have landscape connectivity to habitat occupied by a resilient population.

Justification: Given the potential for loss of core occurrence complexes through extended drought, fire, and other impacts, it is important to maintain sufficient non-core occurrence complexes to connect core occurrence complexes and act as refugia for protection from catastrophic impacts. The 40 non-core occurrence complexes identified in this recovery strategy include those that fall within the existing corridors of ecological connectivity among metapopulations that increase metapopulation resilience, because their distributions encompass the highest known quality habitat within these corridors (include landscape and habitat connectivity). These non-core occurrence complexes also contribute to the relatively high level of species redundancy required to support a viable species distribution composed of resilient metapopulations. Meeting this criterion will demonstrate that the loss of ecological connectivity and fragmentation of habitat (Factor A) have been effectively curtailed and no longer pose a threat to the Quino checkerspot butterfly.

4. A management plan is implemented for populations specified in delisting criteria 2 and 3 that effectively manages and ameliorates impacts from nonnative plants, enhanced nitrogen deposition effects, and increasing atmospheric carbon dioxide effects (Threat Factor A).

5. A management plan is implemented to effectively manage and ameliorate impacts from Off-road vehicle activity and grazing to the populations specified in criteria 2 and 3 (Threat Factors A and E).

6. The risk of permanent population extirpation due to wildfire and climate change (Factor E) is minimized across the species range by protection and management of populations specified in delisting criterion 2 and 3.

All classification decisions consider the following five factors: (1) is there a present or threatened destruction, modification, or curtailment of the species' habitat or range; (2) is the species subject to overutilization for commercial, recreational scientific or educational purposes; (3) is disease or predation a factor; (4) are there inadequate existing regulatory mechanisms in place outside the ESA (taking into account the efforts by states and other organizations to protect the species or habitat); and (5) are other natural or manmade factors affecting its continued existence. When delisting or downlisting a species, we first propose the action in the *Federal Register* and seek public comment and peer review. Our final decision is announced in the *Federal Register*.

Rationale for Recovery Criteria

Recovery criteria are designed as a benchmark against which to assess the amelioration of threats, along with population resilience, species redundancy (number and distribution of populations), and species representation (habitat and genetic diversity among populations). Core occurrence complexes within the species' current range must be protected, as they represent resilient populations or metapopulations that are most likely to rebound from low population numbers after drought, fire, or other stochastic events. All threat factors must be addressed to achieve the population resilience required to maintain species redundancy before species viability can be restored. Protecting habitat and populations at higher elevations and retaining the current range of climate influences maximizes representation across diverse habitat types and ensures local genetic adaptation to climate extremes is not lost and/or habitat where climate change effects are ameliorated (coastal influence and higher elevation habitat) remains available to the species. Timeframes to demonstrate reproduction and a level of population establishment where resilience is uncertain are 2-4 years because of the potential for extended diapause in a drought year (breeding might not happen every year).

In particular, criteria are designed to conserve habitat and ensure management essential for maintenance of resilient metapopulations. Metapopulations require maintenance of habitat and landscape connectivity within metapopulation distributions, and ecological connectivity among them. Two fundamental tenets of the Recovery Plan are the need for amelioration of the impacts of climate change (e.g. downlisting criterion 5) and planning for adaptability. Based on their climate change niche model analysis, Preston *et al.* (2012, p. 289) concluded higher elevation habitats are important, stating "…differences within the distribution of extant [Quino] populations were best predicted by climate variables. Higher elevation populations are buffered from drought." Parmesan *et al.* (2014) found strong support for an ongoing shift of species' distribution upward in elevation, and their model predicted that eventually lands outside of the species historical range would be required for species survival. Parmesan *et al.* (2014, p. 17) concluded "The fundamental conservation message from this example is that we need to increase connectivity among habitats and protected areas and increase species' *in situ* resistance and resilience to climate change by improving the health of populations, species, and ecosystems." California Ecological Subunits identify areas with marine influence (Figure 4) from Goudey and Smith 1994 [2007]: "…ecological units are mapped based on associations of those biotic and environmental factors that directly affect or indirectly express energy, moisture, and nutrient gradients which regulate the structure and function of ecosystems. These factors include climate, physiography, water, soils, air, hydrology, and potential natural communities." Therefore, we focused criteria on population connectivity and well-documented areas of occupancy within coastal climate influence (defined by California Ecological Subunits) and/or proximity to large lakes, and areas with montane climate influence.

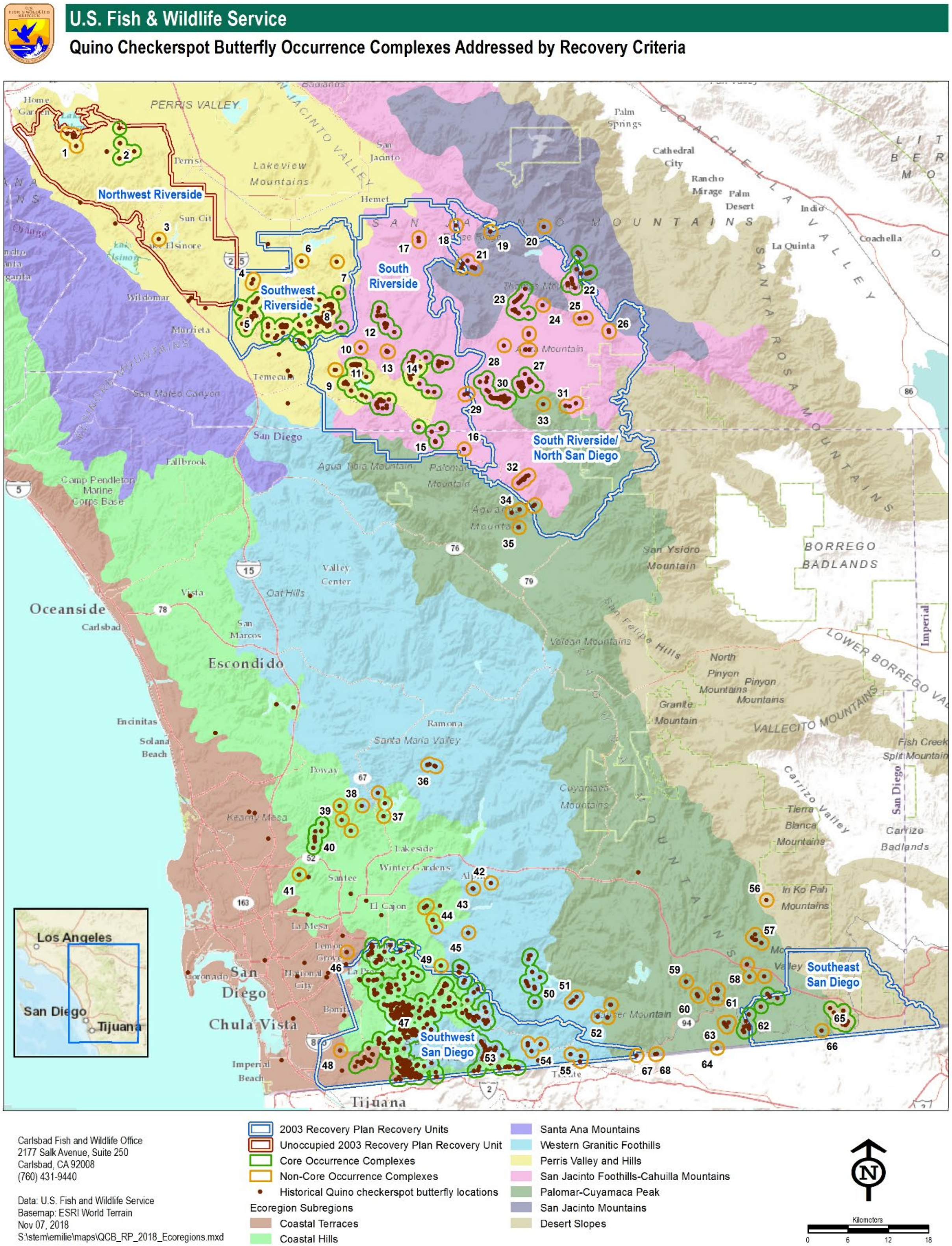


Figure 4. Quino checkerspot butterfly distribution map with California Ecological Subregions.

ADDITIONAL AND AMENDED RECOVERY ACTIONS

The goals of this recovery plan remain: (1) protecting habitat supporting known current population distributions (occurrence complexes) and connectivity among them; (2) maintaining or creating resilient populations; and (3) conducting research necessary to achieve recovery criteria. Recommendations made in the recovery action narrative required to achieve these goals (Service 2003, pp. 96–113) and meet the amended criteria should be generally the same, except with respect to site specificity (updated occurrence complexes as described in criteria, illustrated in Figures 1– 3, and listed in Table 1). Specific sites where actions are applicable should be clear in the recovery criteria. Below are new actions:

1) Seek funding for acquisition of habitat from willing sellers in areas described in delisting criteria (Priority 1).

2) In the South Riverside/North San Diego Recovery Unit, in the vicinity of the community of Anza, determine areas that would best provide ecological connectivity among core occurrence complexes that do not include Tribal lands (Cahuilla Band of Indians). Work with State, Federal, and local government agencies to conserve these areas, and to conserve habitat outside of Tribal lands (Ramona Band of Cahuilla, Santa Rosa Band of Cahuilla Indians) associated with the Bautista Road core, and Table Mountain Truck Trail and Lookout Mountain non-core occurrence complexes. Work with Tribal partners to plan for voluntary ecological connectivity and habitat conservation as appropriate (Priority 1).

3) Determine areas that would best provide ecological connectivity in southern San Diego County among core occurrence complexes that do not include Tribal lands (Barona Band of Mission Indians, Viejas Band of Kumeyaay Indians, Sycuan Band of the Kumeyaay Nation). Work with State, Federal, and local government agencies to conserve these areas. Secure remaining ecological connectivity in non-Tribal land bottleneck north of the Barona Band of Mission Indians' reservation (vicinity of San Vicente Road). Work with Tribal partners to determine recovery value and Tribal conservation status of ecological connectivity within the Capitan Grande Reservation. Work with Tribal partners to plan for voluntary ecological connectivity conservation as appropriate (Priority 1).

4) In Southeast San Diego County, in the vicinity of the communities of Campo and La Posta, determine areas that would best provide ecological connectivity among core occurrence complexes. Work with State, Federal, and local government agencies to conserve these areas. Work with Tribal partners to plan for voluntary ecological connectivity and habitat conservation as appropriate (Priority 2).

COSTS, TIMING, PRIORITY OF ADDITIONAL RECOVERY ACTIONS

The additional recovery actions are not anticipated to significantly affect estimates of cost and timing described in the recovery plan.

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